NETWORK WORLD
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DEC unveils a 486-based superserver

By Tom Smith
Senior Writer

MARLBOROUGH, Mass. — Digital Equipment Corp.'s General Systems Business (GSB) division last week announced a multiprocessing, dual-bus Intel Corp. 80486-based microcomputer positioned as a superserver or X Window System server.

Supporting as many as six 33-MHz 80486s, 64M bytes of system memory and 6G bytes of disk storage, the new ApplicationDEC 433MP, running The Santa Cruz Operation, Inc.'s SCO Unix, poses a threat to servers such as Compaq Computer Corp.'s SystemPro.

Analysts expressed confusion about the strategy behind the announcement — the product represents a departure from DEC's proprietary VAX architecture — and warned that the server could even erode VAX sales.

Analysts applauded the product for its price and performance, though at least one disputed the superserver label, saying the product is more accurately described as a multiuser system. DEC says the machine can act as a multiuser system but claims it is in the same class as Compaq's 80486 SystemPro.

"By comparison to what's out

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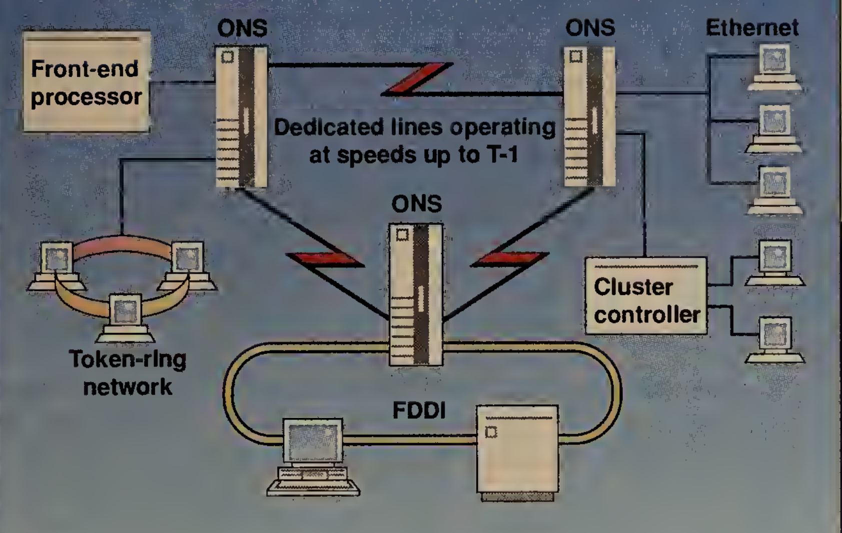
NCR offers OSI backbone router



NCR's Open Network System (ONS) enables users to build OSI backbones capable of routing IBM SNA, TCP/IP and other LAN protocols by encapsulating them in OSI's Connectionless Network Protocol.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: NCR CORP., DAYTON, OHIO

WATS eclipsed as virtual net service star ascends

By Bob Wallace
Senior Editor

Growing user interest in virtual network services and aggressive carrier migration efforts have raised questions about the future of WATS as a high-end service offering.

Analysts say AT&T, MCI Communications Corp. and US Sprint Communications Co. have clearly positioned virtual networks — once pitched as a way to supplement private networks — as their flagship offerings.

The carriers are even marketing virtual network services to users that spend as little as $20,000 a month on outbound calling.

Migrating WATS users to virtual network contracts enables carriers to lock up customer accounts and increase revenues by selling a myriad of optional features.

Even users with heavy off-net calling patterns say moving to virtual networks makes sense because the services offer competitive pricing, more features than WATS and larger volume discounts.

"There is no question that the

(continued on page 72)

NCR rolls out router for OSI backbones

Open Network System envelops various network protocols into OSI packets for passage across net.

By Jim Brown
Senior Editor

BOSTON — NCR Corp. last week introduced a router that will enable users to build Open Systems Interconnection backbones capable of transporting data among devices supporting a variety of network protocols.

Announcement of the Open Network System (ONS) rounds out a three-phase overhaul of NCR's product line. Last month, NCR introduced the System 3000 line of Unix-based laptops, workstations, servers and superservers.

Earlier this month, the firm announced availability of its Cooperation software, a set of development tools for building client/server applications. Cooperation was introduced in February along with NCR's Open Cooperative Computing Architecture, a blueprint for linking applications on NCR processors to those on other vendors' systems.

"ONS is the base networking product that ties all the previous announcements together," said Tad Bodeman, product manager for the ONS line. "It enables NCR to go in and solve enterprisewide computing problems with an OSI solution."

ONS wraps various vendors' networking protocols into OSI packets that comply with the U.S. Government OSI Profile (GOSIP) or the U.K. GOSIP. Those packets are routed to another ONS that unwraps the OSI packet and for-

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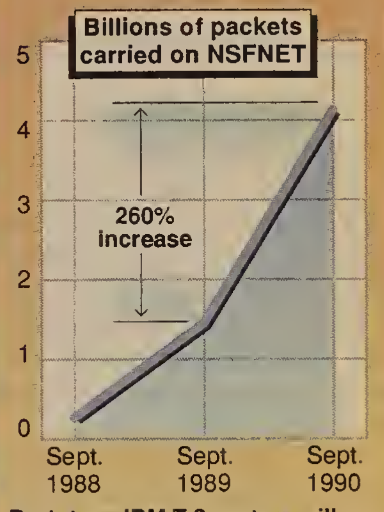
NSFNET prepares for T-3



Prototype IBM T-3 routers will help the National Science Foundation Network keep pace with its dramatic growth in usage.

See story, page 2.

SOURCE: MERIT, INC. ANN ARBOR, MICH.
GRAPHIC BY SUSAN J. CHAMPENY

NETLINE

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AT&T, KDD JOIN FORCES to develop a 2.4G bit/sec undersea fiber link between the U.S. and Japan. Page 2.

INGRES ENHANCES its distributed data base software to give users access to other vendors' data bases across LANs and WANs. Page 2.

THE BIG THREE CARRIERS post mixed third-quarter financial reports. Page 4.

NET POSTS ITS SECOND straight quarterly loss, this one at $8.2 million. Page 4.

WANG TAKES STEPS to bolster the LAN server capabilities of its VS minicomputers. Page 6.

LAN TEST SERIES examines three leading continuous backup systems. Page 44.

NEWSPAPER

FEATURE

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Users, vendors, carriers map future of networks

By James Herman, Mary Johnston-Turner and David Mason
Special to Network World

Users have often been frustrated at the varying ways vendors and carriers respond to network integration.

At the root of this problem are serious differences in the basic expectations of users and suppliers.

Each group has overlapping but divergent views on how the computer and communications industries will look by the mid-1990s.

We have synthesized these visions into snapshots, or "end states," of five possible futures: a world driven by standards, another based on new technology, a third driven by more ubiquitous networks, a fourth that would bring less expensive networks, and finally, a world that eschews integration and where networks are based on proprietary systems.

To crystallize thinking on trends, we have held workshops, with participants from user firms, computing ven-

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Users take wary view of frame relay

Last in a three-part series on the emergence of frame relay technology.

By Bob Wallace
Senior Editor

While some users eagerly await delivery of frame relay products and services, others are taking a wait-and-see attitude toward the heavily promoted technology.

Proponents say they need frame relay to support such wide-area data communications applications as local-area network interconnection, bulk file transfers, imaging and videoconferencing. But skeptics say the

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NSFNET to employ IBM T-3 prototype routers in net

Net officials claim RISC System/6000 routers outperform all commercially available routers.

By Paul Desmond
Senior Editor

ANN ARBOR, Mich. — To keep up with dramatic growth and prepare for new applications, the National Science Foundation Network (NSFNET) will build a T-3 backbone using prototype IBM interface cards and routers based on IBM's RISC System/6000.

The T-3 net will augment an existing T-1 backbone that uses another prototype IBM router based on IBM's older Unix machine — the RT Personal Computer — and Token-Ring Networks.

NSFNET officials said both prototypes offered greater performance than commercially available routers when they were selected for use in the nationwide research network.

Prototype T-1, T-3, Ethernet and Fiber Distributed Data Interface adapter cards will link the RISC System/6000 routers to carrier services and local-area networks. IBM declined to say whether the prototype cards or T-3 router will become commercially available products.

"We are very interested in taking technology that we deploy in NSFNET, learning from its use and then, over time, commercializing it," said Alan Baratz, direc-

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AT&T, KDD to construct high-capacity Pacific link

Cable will have 8 times capacity of Haw-4/TPC-3.

By Barton Crockett
Senior Editor

BASKING RIDGE, N.J. — AT&T last week said it is working with Japanese carrier Kokusai Denshin Denwa, Ltd. to develop a 2.4G bit/sec fiber-optic transmission system for a submarine cable to be installed between the U.S. and Japan in 1996.

The Trans-Pacific Cable-5 (TPC-5) is expected to be the first submarine fiber cable to use emerging optical amplification technology and will provide more than eight times the capacity of the only fiber system now connecting the two countries, the Hawaii-4/Trans-Pacific Cable-3 (Haw-4/TPC-3).

Observers said use of optical amplification could revolutionize international communications by making it possible to increase the capacity of submarine cables by simply changing the hardware at cable end points.

Transmission rates on current fiber cables cannot be increased because the mid-cable signal regeneration repeaters on the bottom of the ocean would also have to be replaced.

While regeneration repeaters are now being designed that would support speeds of 1.8G bit/sec, experts aren't sure if speeds will be able to rise significantly higher using this technology.

By contrast, optical amplifiers

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Ingres extends capabilities of DBMS, offers gateways

By Charles Bruno
Assistant Managing Editor

ALAMEDA, Calif. — Ingres Corp. last week announced enhancements to its Ingres distributed DBMS that enable users in a client/server environment to access data bases from several vendors across local- or wide-area networks.

Ingres unveiled gateways to IBM's IMS, DB2 and SQL/DS data bases, and announced enhancements to existing gateways that provide access to Digital Equipment Corp.'s RMS and Rdb data bases. The company said the gateways enable users to join data from local and remote IBM and DEC relational and nonrelational data base management systems as if they were local DBMSs.

In addition, the company enhanced its Ingres/Star distributed data base manager that enables users to automatically update Ingres/Star data bases across a network. The company outfitted Ingres/Star with an autorecovery management feature and a centralized management capability that enables administrators to monitor data base activity.

Ingres/Star manages distributed Ingres data bases as a single virtual relational data base. It can

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Briefs

FCC says price caps are working. The Federal Communications Commission sent a report to Capitol Hill last week praising AT&T's performance under the first year of price cap regulation. The agency said prices for all three categories of service — residential, 800 and other business services — had fallen 4.3% during the first year of price caps. The report said AT&T continued to invest in and maintain the network with no detectable decrease in quality. The FCC acknowledged that price caps had not streamlined the tariff process as much as AT&T had hoped.

Euro railnet to be studied. A consortium of 11 European national railroad companies announced last week they have commissioned a feasibility study on ways in which they can upgrade their shared network to support X.25 packet switching and other advanced services, such as electronic mail.

The study will also consider the possibility of laying fiber-optic cable along railway beds and offering services in competition with Europe's national carriers.

IBM gains, but DEC still struggles. IBM last week posted $1.11 billion in third-quarter earnings, up 26.8% from $877 million in the third quarter last year. Revenue grew 6.8% from $14.31 billion in 1989 to $15.28 billion this quarter. Analysts praised IBM's cost-cutting efforts but expressed concern about disappointing personal computer and international sales. Rival Digital Equipment Corp. reported an 83% drop in earnings to $26.2 million for its first fiscal quarter, ended Sept. 29, down from $150.8 million for the comparable period in 1990. Revenue fell 1%, to $3.09 billion compared with $3.13 billion in the comparable quarter last year.

Soft-Switch, DG to work together. Industry sources said last week that Soft-Switch, Inc. is expected to announce today a cooperative effort with Data General Corp. to jointly develop a version of its Soft-Switch Central, a switching system that links multivendor electronic mail products, to run on DG's Unix-based AViiON computers. Soft-Switch is also expected to announce that it will license its application program interface to a number of software vendors at this week's Electronic Messaging '90 conference in San Francisco.

In addition, sources said 3Com Corp. plans to dump its own electronic messaging product development. 3Com is negotiating with cc:Mail, Inc. to provide a replacement product, sources said. Both companies declined to comment.

Sprint to sell DG AViiON systems. Sprint International, the public value-added network arm of US Sprint Communications Co., last week said it will resell Data General Corp.'s AViiON line of Unix servers and multiuser systems. DG expects the deal, which includes options for maintenance, software support, training and consulting services, will be worth more than $45 million over five years.

AOS providers reined in. President Bush last week signed into law a congressional bill designed to protect consumers from price-gouging by alternative operator service (AOS) providers. The new law requires AOS providers to identify themselves and be able to quote rates when a call is initiated. The law also orders AOS companies to file tariffed rates with the Federal Communications Commission and mandates that 18 months from now, domestic and imported equipment and software used by businesses to handle operator service calls must be capable of providing callers with access to the long-distance provider of their choice.

AT&T cries thief. AT&T last week accused MCI Communications Corp. and other carriers of stealing its long-distance accounts. An AT&T vice-president told a House Government Operations subcommittee that in the last six months, more than 90,000 AT&T customers have complained to AT&T of being switched to another carrier without permission. An MCI vice-president acknowledged the problem but said AT&T has exaggerated the issue.

Codex enters frame relay fray. Codex Corp. is expected to enter the frame relay race this week by announcing support for the interface standard on its 6290 T-1 multiplexer, its 6525 X.25 Packet Switch and a new 6500 Series packet assembler/disassembler. The products are expected to be available in the first quarter of 1991.

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MCI, US Sprint report 3Q losses, AT&T posts slight earnings gain

Results show end to long-distance industry's runaway growth.

By Bob Brown
Senior Editor

The Big Three long-distance carriers, AT&T, MCI Communications Corp. and US Sprint Communications Co., last week reported mixed third-quarter financials, with MCI posting a substantial loss due to a onetime asset write-down and US Sprint reporting a decline in operating profit.

AT&T's earnings grew slightly for the three months ended Sept. 30.

MCI's $176 million loss, which was expected, reflected a $550 million write-down related to the company's decision to speed up modernization of its network from analog to digital facilities. Without the asset write-down, MCI would have had earnings of $180 million, up 14% from $158 million reported in the third quarter last year.

MCI had third-quarter revenue of $2 billion, up 20% from revenue of $1.67 billion in the third quarter last year. Third-quarter 1990 revenue included revenue from Telecom*USA, Inc., which MCI acquired for $1.25 billion in August.

Bert Roberts, MCI's president and chief operating officer, said the company's growth late in the quarter was negatively affected by "a slower overall economy." He said the introduction of MCI Vision, an offering designed to provide small business customers with services traditionally reserved for large users, and the announcement of MCI's Virtual Private Data Services should help boost MCI's sales in coming months.

US Sprint, meanwhile, continued to struggle in the third quarter, as its operating profit fell 13% to $53.9 million from

(continued on page 73)

NET announces second-quarter loss of $8.2m

By Ellen Messmer
Washington Correspondent

REDWOOD CITY, Calif. — Network Equipment Technologies, Inc. (NET) last week posted an $8.2 million operating loss for its fiscal second quarter ended Sept. 30.

The T-1 equipment maker posted the loss on revenue of $37.1 million for the quarter, down 21% from the comparable quarter a year ago when it reported revenue of $46.9 million.

The loss is the second in a row for NET, which last quarter reported a first-ever loss of $20.8 million. However, the company noted that second-quarter revenue was up 43% compared with the fiscal first quarter. A onetime extraordinary gain of $2.4 million, coming from NET's repurchase of $6.4 million in convertible debentures, helped buoy second-quarter results.

Analysts said the revenue increase could represent a turnaround for the troubled company, which last April admitted to improprieties in order processing and was forced to take a substantial write-down and restate fiscal year 1990 earnings.

NET was guardedly optimistic about the figures released last week. A company spokesman said NET would not comment on the outlook for the remainder of the fiscal year but emphasized that the company is striving to hold down operating expenses across broad segments of its business. Last April, NET laid off 10% of its personnel; the company now employs 1,100 workers.

Daniel Warmenhoven, NET's president and chief executive officer, said he was pleased with the amount of business generated through NET's IBM sales channels, up $1.3 million from the first quarter.

But sales from the IBM sales channels are down 47% in dollar terms from the comparable quarter a year earlier.

Andy Schopick, a financial analyst with Nutmeg Securities, Inc., of Southport, Conn., said that although the worst is likely over for NET, the company still had unreasonably high operating expenses for its current revenue level. He predicted NET would post another loss in the third quarter, possibly break even in the fourth and finish the year in the red.

NET pointed out that it increased its international sales in the second quarter, primarily in Western Europe, and is looking abroad for future growth.

Analysts said the domestic market for the company's Integrated Digital Network Exchange (IDNX) line of T-1 multiplexers appears stagnant at the moment.

"IDNX is a high-performance but high-priced product that can handle a great deal of traffic," Schopick said. But because corporations are moving to hybrid public/private networks, the market demand is shifting to low-end models, he added.

NET, in an attempt to capture business in this market segment, will ship a new product, the ADNX/48, during the next quarter.

The company describes the ADNX/48 as a network product that allows customers "to extend public, private or hybrid networking services from central locations to remote sites." ☑

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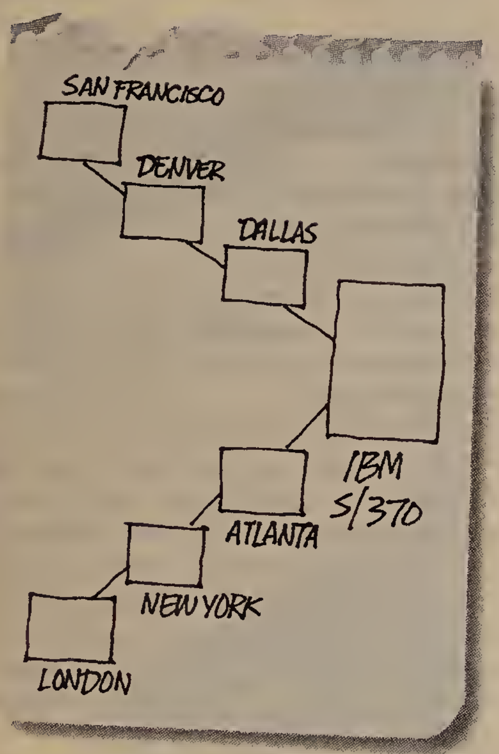

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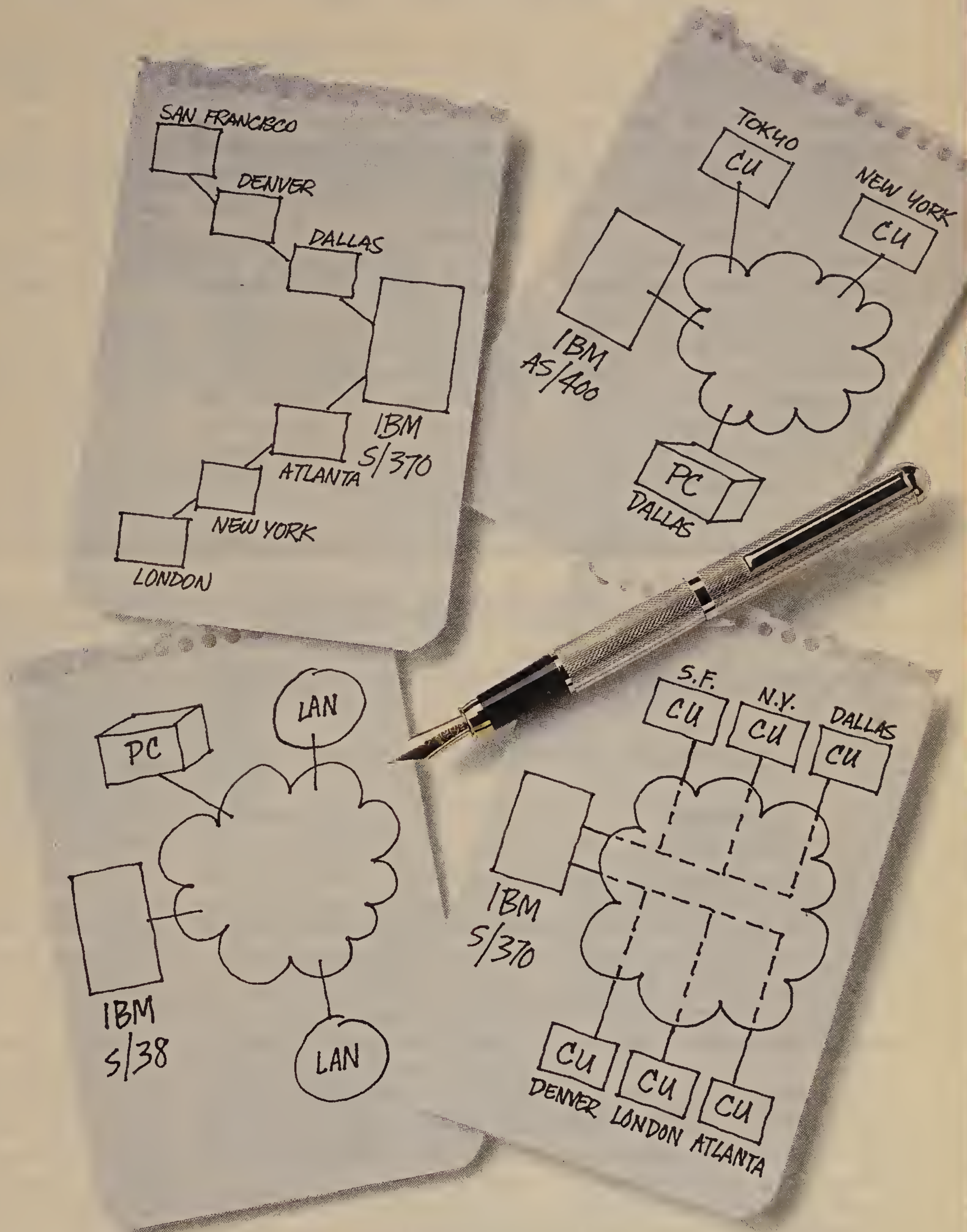

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Wang takes steps to pump up VS mini as LAN server

Firm customizes VINES, extends NetWare pact.

By Jim Brown
Senior Editor

LOWELL, Mass. — Wang Laboratories, Inc. last week announced a bevy of products and partnerships designed to bolster the position of its VS minicomputers as LAN servers.

The company introduced a customized version of Banyan Systems, Inc.'s VINES server software that enables the VS to act as an application, file, print and communications server for personal computers on Ethernet and token-ring local-area networks.

Wang also entered into an agreement with Novell, Inc. to continue reselling NetWare and announced new OEM agreements with Proteon, Inc. and 3Com Corp. Wang will resell Proteon and 3Com token-ring adapters in addition to 3Com's Ethernet adapters and NETBuilder bridges and routers.

Wang also announced relationships with four other companies that will supply software needed to build client/server applications that work with Wang's new products. The vendors will work with Wang to develop versions of their development tools for OPEN/server — VS, Wang's version of VINES.

OPEN/server — VS enables microcomputers running VINES client software to emulate a VS terminal and log on to VS applications. Personal computers can also run DOS applications and store DOS files on the VS and share VS-linked printers.

In addition to supporting personal computers on the same Ethernet or token ring as the VS, OPEN/server — VS supports workstations that are directly connected to a VS via a Wang Local Office Connection, a coaxial cable adapter or an asynchronous dial-up link. OPEN/server — VS is scheduled to ship in the first quarter of 1991 and is priced from $3,710 to $17,580.

Users can install several optional Wang applications, also scheduled to ship in the first quarter, that work with OPEN/server — VS to provide additional func-

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Specialty retailers urge peers to join buying group

Seek to gain discounts on communications gear.

By Bob Brown
Senior Editor

ST. LOUIS — An ad hoc group of specialty retailers last week appealed to industry peers to join a proposed buying consortium that would negotiate bulk discounts on communications equipment and services from suppliers.

Executives from The Gap, Inc., Trader Joe's Co. and B. Dalton Booksellers lobbied attendees at Riscon '90, a trade show sponsored by the National Retail Federation (NRF), in order to swell the group's ranks and present a united front to equipment and service suppliers. By offering a plea for additional support, the group hopes to sign up enough new members to qualify for larger discounts.

"We want to lower costs and improve customer service," said Mick Connors, a senior vice-president at The Gap.

The group said existing communications services and products are not designed to meet the unique needs of individual specialty retailers, which generally have many geographically dispersed locations that generate low to moderate network traffic.

A draft proposal issued to conference attendees stated, "As a major retailer, you obviously understand the concept of 'cheaper by the dozen.' This basic principle can now be applied to reduce your telephone bills by as much as 30%."

The proposal outlined the group's objectives, which include creating "enough combined clout" to force vendors to develop network products and services designed to meet the needs of specialty retailers.

"By banding together and sharing communications solutions and even facilities, specialty chain retailers can eliminate many of the obstacles that make individual solutions so expensive," the proposal stated.

Another goal is to obtain lower costs for network services by aggregating volume and leveraging the geographic proximity of members' stores.

At the group's first major meeting in Dallas three months ago, specialty retailers representing $12 billion in combined revenue and about 9,500 stores met with 19 vendors to outline their demands for equipment and services that would satisfy their unique communications needs ("Specialty retailers proffer list of demands to vendors," *NW,* July 30).

Having since dubbed its proposal Specnet, referring to a possible shared communications network for specialty retailers, the group last week established a Nov. 15 deadline for raising $250,000 in pledges to set up a legal entity for negotiating bulk purchasing deals with vendors. So far, the group is more than halfway to its goal.

If that goal is not met by the deadline, a buying group will probably still be formed, sources familiar with the plan said.

The buying group's first mission will be to negotiate better rates with long-distance and local telephone carriers, said Mark Lilien, vice-president of systems

(continued on page 8)

N.Y. Tel says proposed rate hike cut to curb investment

By Anita Taff
Washington Bureau Chief

ALBANY, N.Y. — New York Telephone Co. warned users last week that if regulators proceed with a plan to slash its 1991 rate increase request by 97%, its ability to invest in new network technologies will be significantly hampered.

The warning came in response to last week's decision by three administrative law judges recommending that the New York Public Service Commission (PSC) grant the carrier only 3% of the rate increase it requested for 1991.

New York Telephone had originally asked for $964.6 million, an amount that was later scaled back to $831.7 million. But the judges recommended rate increases of only $23.6 million.

"If adopted, this decision would stunt the development of modern telecommunications in New York," the company said in a prepared statement.

Users didn't seem overly concerned with the carrier's dire predictions, saying that even if New York Telephone gets lower rate increases, it will be forced by competitive necessity to continue investing in the network.

"They'd be cutting their own throat if they [cut back on network investment]," said Tom Festa, president of the Wall Street Telecommunications Association. "They've got [rivals] like Metropolitan Fiber Systems [Inc.] and Teleport Communications putting the pressure on."

Festa pointed out that New York Telephone has committed to building a new fiber-optic network for data services, dubbed the Securities Data Network, as part of an agreement with the Securities Industry Association (SIA).

The carrier already provides a fiber network for SIA's voice needs.

Festa, who is also a member of the SIA, said users expect service on the data network to begin next March. "That would be a kick in the face to pull back the funds and not do it," he said.

Don Gaffney, vice-president of communications at Fundamental Brokers, Inc., agreed that New York Telephone will be forced to continue upgrading its network, "just to keep pace with day-to-day requirements. So much of [New York Telephone's] plant is outdated, especially in the financial district," he said.

Besides, Gaffney added, current rates give the carrier ample funds to invest in new technology. "Their rate requirements were so overblown that it's ridiculous," he said.

Although the judges' recommendation will likely weigh heavily in the decision, the New York PSC is under no obligation to adopt their suggestions. The PSC will issue a final decision in December based on the recommendation of the judges and additional comments that will be filed this month and next.

New York Telephone has been operating under a rate moratorium since 1986, and this is the first chance the carrier has had to ask for increased rates.

The administrative law judges said the carrier had failed to justify all the costs it was seeking to cover with the higher rates.

For example, the judges threw out $108 million targeted for network maintenance costs. The judges said the carrier failed to maintain the network properly over the last five years and that users shouldn't have to pay more to get the network back on its feet, according to a source involved with the case who requested anonymity.

"The 1991 maintenance costs were ruled as excessive because [New York Telephone] blew it back in the 80s," the source said.

The judges also lowered the carrier's rate of return — the level of profit the firm is allowed to earn — from 11.99% to 10.44%. That move resulted in the rejection of $136 million of the requested rate increase.

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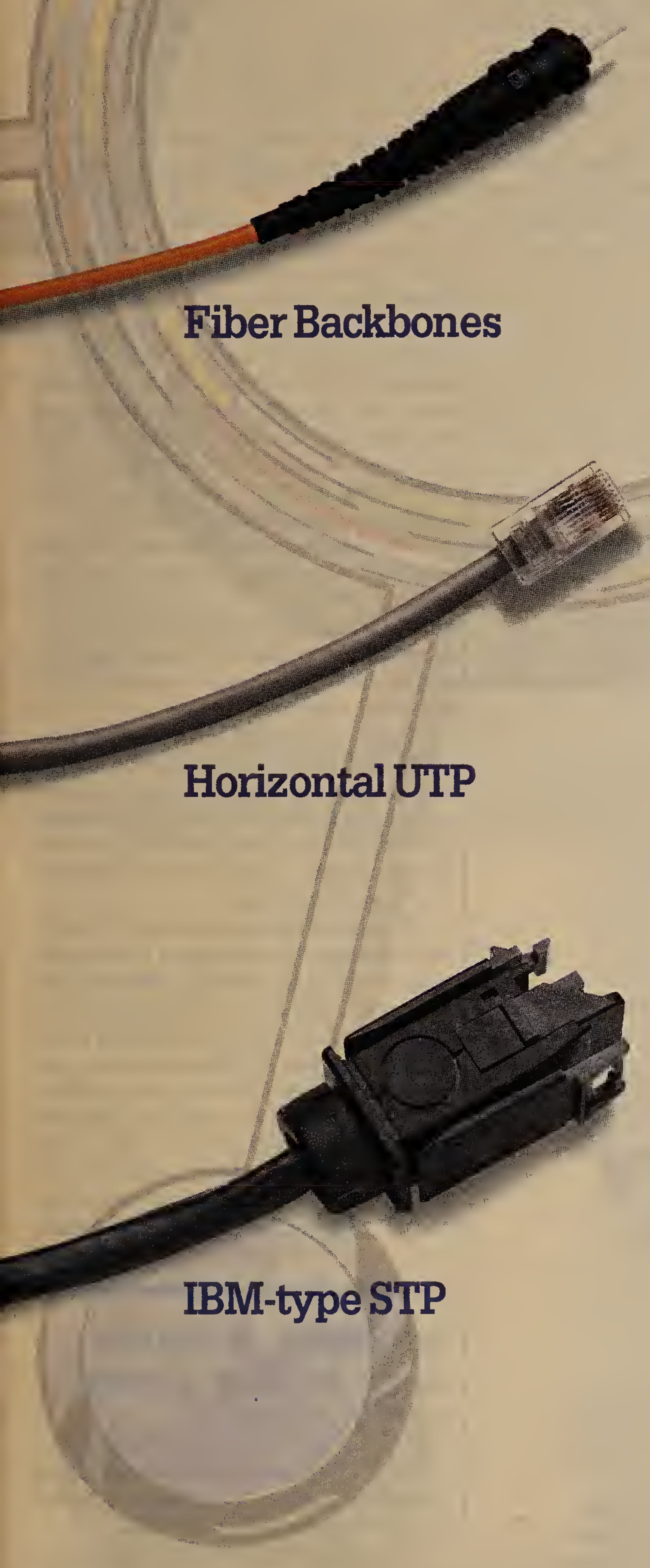

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AT&T switch software upgrade gives Centrex users PRI support

The software, already used on about 100 local 5ESS switches, supports ANI, call-by-call selection and ADCR call features.

By Bob Wallace
Senior Editor

BASKING RIDGE, N.J. — AT&T Network Systems Group reported last week that local carriers have upgraded roughly 100 5ESS central office switches with its 5E6 software to enable Centrex users to support Integrated Services Digital Network Primary Rate Interface (PRI) links to long-haul carriers.

The PRI Nodal/Centrex Express (PRINCE) component of the 5E6 software lets 5ESS Centrex customers access features such as automatic number identification (ANI), call-by-call service selection and alternate destination call redirection (ADCR) in communications with AT&T 4ESS toll switches.

Users can also utilize PRI to access AT&T's Software-Defined Network (SDN), Megacom, Megacom 800, MultiQuest and Accunet Switched Digital Services. Before PRINCE, Centrex users served by 5ESS switches were unable to use PRI features.

Lisa Pierce, AT&T Business Communications Services ISDN product manager, estimated that by year end, 250 5ESS switches will be equipped with the 5E6 software needed to support PRINCE.

Three regional Bell holding companies — Ameritech, Nynex Corp. and US West, Inc. — have installed the 5E6 software in many of their 5ESS switches and have expressed interest in offering PRINCE.

Although pleased by the announcement, Centrex users say it could be some time before the RBHCs actually tariff PRINCE, and they add that many Centrex

(continued on page 76)

PC MAGAZINE
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COMPUTER RESELLER NEWS

UDS V.32 Modems: winners at 19.2 kbps—now FasTalk doubles the speed

From the day of its introduction, UDS' V.32 modem has gathered honors from leading computer publications and other industry watchers!

Initially it set the standard for 9.6 kbps, full-duplex traffic over dial-up lines. When MNP® level 5 data compression was added, throughput went to 19.2 kbps.

Now comes the FasTalk V.32/42b—a modem that is specifically designed for PC applications and is fully compliant with CCITT's V.42*bis* recommendation. Meeting this standard gives the V.32/42b a maximum data rate of 38.4 kbps!

The modem is particularly useful for bit-intensive data transfers, such as engineering graphics, image processing and complex financial operations. Data Rate is automatically adjusted to 9600, 4800, 2400 or 300 bps (CCITT V.32 and V.22*bis*). At the 9600 bps rate, trellis coding gives the FasTalk V.32/42b an exceptionally high tolerance for noisy lines.

For accurate communication over worst-case lines, the unit incorporates V.42 LAP-M and MNP 4 error control functions. A full complement of on-board test functions is included, and eight LEDs provide easy monitoring of the unit's operation and built-in diagnostic features.

Get acquainted with the latest winner in the UDS V.32 family. For technical details and quantity pricing, contact UDS, 5000 Bradford Drive, Huntsville, AL 35805-1993.
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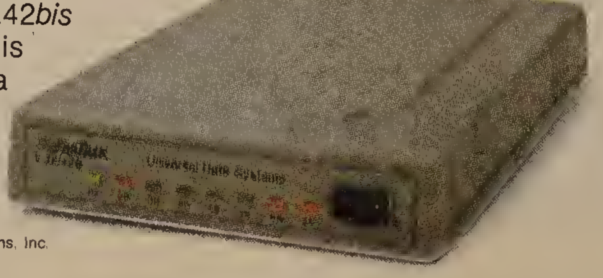

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See The FAXNeT Form on Page 27

Retailer paints rosy picture of VSAT migration

By Bob Brown
Senior Editor

ST. LOUIS — Communications executives at Target Stores, Inc. were somewhat nervous about moving from a terrestrial voice and data network to a VSAT setup, but the migration has paid off in many ways, a company official said last week.

By deploying a very small aperture terminal network nationwide, Target has been able to get a better handle on network costs, improve network reliability and add new nodes without significant delays.

Target's VSAT network supports a growing series of data applications, including credit card and check authorization, point-of-sale polling to collect sales information, downloading price changes to stores and tracking merchandise received and employee attendance. It also supports all intracompany voice traffic.

Mike Machones, director for planning and information management at Dayton-Hudson Corp.'s $7.5 billion Target Stores division, discussed his company's VSAT experiences at Riscon '90, a trade show for information technology professionals in the retail industry.

Target began pilot tests with VSATs in 1988, and, impressed with the technology, began installing VSATs in earnest at its remote sites in August 1989. By last February, Target had about 430 VSAT sites on the net tied into a shared hub in Minneapolis, Target's home base.

The shared hub supports two 512K bit/sec links from the company's Minneapolis data center to the satellite, which in turn supports 128K bit/sec transmissions to the stores. The net supports Target stores in 31 states, and distribution centers, district and regional offices and data centers.

The retailer could have cost-justified buying its own hub given its many locations and growing network traffic, but Target executives opted for a shared hub from Hughes Network Systems, Inc. and Hughes

(continued on page 75)

Specialty retailers urge buying group

continued from page 6

and distribution at B. Dalton Booksellers. A Tariff 12 deal with AT&T is one of many possibilities that the group hopes to pursue in the next few months, he added.

The group also plans to shop around for better and more cost-effective credit card authorization network services. Should the group land a contract for higher speed services at a lower cost, members could speed up credit card authorizations.

Membership in the nonprofit cooperative would be restricted to specialty retail chains that are NRF members. Initial funding will be provided by assessing each member $25 for each $1 million of net retail sales for the latest fiscal year, with a minimum membership fee of $1,000.

Members that join after the buying consortium is under way will be charged $50 on each $1 million in sales, thus rewarding "the risk takers," Lilien said.

Interested parties should contact the NRF in New York.

INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS AND FINANCIALS

Worth Noting

"Even if the telephone industry were allowed to compete in the cable television industry through fiber deployment, the estimated cost of deploying fiber ranges from $200 billion to $400 billion. Cable TV is a $15 billion to $20 billion industry. This argues for phone companies' careful consideration before entry."

Stephanie Georges
Telecommunications analyst
Salomon Brothers, Inc.
New York

People & Positions

Larse Corp. last week said it has named **James Montigiello** to succeed **Melvin Perkins** as president of the New York-based multiplexer manufacturer. Perkins will continue as chief executive officer until his planned retirement in December. Montigiello previously held the position of executive vice-president.

Newbridge Networks, Inc. last week announced the appointment of **Khaled Nasr** to the newly created position of vice-president of network services, where he will consolidate several customer service and support groups under one organization.

Nasr will be responsible for delivering training, installation, maintenance, technical assistance and other support services to all Newbridge customers, including end users and carrier clients.

Previously, these responsibilities were split among separate groups serving those markets. Nasr will report directly to Newbridge President Peter Madsen. ◻

Octel's new chief strives to keep firm in top spot

Decline in 1Q earnings brings new challenges.

By Bob Brown
Senior Editor

MILPITAS, Calif. — When Douglas Chance arrived two weeks ago at Octel Communications Corp., where he was recently named president and chief executive officer, he was greeted warmly by scores of voice mail messages from new colleagues.

But three days later, Chance received a far less cordial welcome when Octel reported a 21% earnings drop that snapped the company's string of 13 consecutive quarters of earnings growth.

Last week, in a telephone interview, Chance said his top priorities are keeping Octel on top of the voice mail market, not allowing a disappointing first quarter to knock the company off track and diversifying the company's offerings.

"My first objective is to continue the momentum that Octel has achieved in recent years," said Chance, who will handle day-to-day operations at Octel, buying time for Robert Cohn, company founder and chairman, to focus on long-range planning.

Nine months ago, Cohn announced plans to search for a top executive who could bring some management controls to Octel since the start-up he founded in 1982 reached $100 million in sales.

Chance, a 24-year Hewlett-Packard Co. veteran who had been sitting on Octel's board of directors since November 1988 and most recently served as executive vice-president in charge of HP's Networked Systems Sector, fit the bill.

But now, with customers reining in network expeditures to prepare for a possible recession, Chance will be forced to cut costs to compensate for any revenue loss brought on by the economic uncertainties that the company said contributed to its fiscal first-quarter slide.

First-quarter earnings fell 21% to $2.9 million, down from earnings of $3.7 million in the first quarter last year. Revenue — which grew at a 47% clip in fiscal 1990 compared to the year before — rose a less impressive 25%, from $28.2 million during last year's first quarter to $35.2 million in the opening quarter of fiscal 1991. Cohn said results were affected by "uncertainty in the economy that caused delays

(continued on page 10)

INDUSTRY BRIEFS

Vendors jump on frame relay bandwagon. Northern Telecom, Inc. last week said 19 more vendors have pledged support for a common specification for interoperability among frame relay equipment.

Among the companies joining the effort are Advanced Computer Communications, 3Com Corp., Timeplex, Inc., Vitalink Communications Corp. and Wellfleet Communications, Inc. Initially, Northern Telecom joined with Digital Equipment Corp., cisco Systems, Inc. and StrataCom, Inc. to adopt a specification based in part on a proposed ANSI standard for frame relay.

Vitalink reports earnings dive. Vitalink Communications Corp. last week posted a 60% drop in earnings and an 18% decrease in revenue for its fiscal fourth quarter.

Fiscal fourth-quarter results, combined with a weak third quarter, contributed to a 29% slide in earnings for the year, the company said.

The Fremont, Calif., internetworking equipment vendor reported $2.1 million in earnings for the fourth quarter ended Sept. 30, down from $5.4 million for the corresponding quarter the year before. Last year's fourth-quarter earnings included a $1.2 million credit from a tax loss carryforward.

Vitalink reported fourth-quarter revenue of $14.1 million, down from $17.1 million in the fourth quarter of last year.

For the 1990 fiscal year, Vitalink reported earnings of $13.3 million, down from earnings of $18.7 million the year before. Annual revenue was $66.8 million, up from $67.2 million in fiscal 1989.

(continued on page 10)

Software shops take hard stand

Charter members of the Software Business Practices Council, which was formed to improve ethics in the software industry

AICORP, Inc.
Ashton-Tate Corp.
Banyan Systems, Inc.
Chipcom Corp.
Cognos, Inc.
Datamedia Corp.
Digital Equipment Corp.
Hewlett-Packard Co.
Ingres Corp.
Intec Controls Corp.
Integral Systems, Inc.
Interleaf, Inc.
Lotus Development Corp.
Multiview, Inc.
Price Waterhouse
Ross Systems, Inc.
Sybase, Inc.

GRAPHIC BY SUSAN J. CHAMPENY
SOURCE: SOFTWARE BUSINESS PRACTICES COUNCIL

Software firms form group to raise ethics

Seventeen vendors establish council to discourage vaporware tactics, reform questionable practices.

By Ellen Messmer
Washington Correspondent

BOSTON — Seventeen software vendors recently joined together here to establish the Software Business Practices Council, which is attempting to crack down on vaporware announcements and other misleading marketing practices.

By reforming what many vendors consider unethical practices concerning the dissemination of product and financial data, the vendors say they hope to enable users to develop realistic product implementation timetables.

The council, which includes Ashton-Tate Corp., Digital Equipment Corp., Hewlett-Packard Co. and Sybase, Inc., among others, issued a report condemning vaporware and other practices in which vendors "misleadingly imply the presence of features and capabilities that will actually not be obtainable until much later."

The report stated, "We believe some of these practices — most notably, the vacuous product announcement dubbed vaporware and other misrepresentations of product availability — have already hurt the industry because they have negatively affected its credibility."

In addition to vaporware, the report identified other troubling tactics, such as exaggerated claims for product capability and benchmarking performance, as well as financial reporting practices that artifically inflate revenues and research and development expenditures.

The report stated that vendors, by using inconsistent methods of software revenue reporting and R&D capitalization and disclosure, make it impossible for investors and users to fairly compare vendor financial status.

The report argues that distorted buying patterns are created in the wake of blockbuster vaporware announcements for products promised far in the future. Users wait months and sometimes years for products that either don't materialize, are late or are significantly downscaled from original promises.

"Vaporware gives the software industry a black eye," said Stuart Woodring, director of software strategy research at Forrester Research, Inc., in Cambridge, Mass. "It sets user expectations sometimes at a substantial distance into the future. It has the effect of freezing users' purchases. And then it doesn't materialize."

"Vaporware gives the software industry a black eye," Stuart Woodring said.

▲▲▲

One vendor's vaporware announcement triggers additional announcements as vendors rush to convince users that they will have competing products, analysts said. The result, they added, is a market increasingly lacking in real direction.

The report urges members to consider the difference between a product announcement and a statement of direction.

The Council's founder, Jeffrey Papows, chairman and chief executive officer of COGNOS Corp.,

(continued on page 10)

Octel chief strives to keep firm in top spot

continued from page 9

in orders from some customers."

Chance said he would also like to diversify Octel into other related markets, especially sectors in which he could leverage experience he gained at HP. For instance, he said he would like to see Octel offer integrated messaging products that would interface with electronic mail and facsimile devices. "I could see an employee on the road calling into the Octel system at his home office to retrieve voice and electronic mail messages, and meanwhile, faxes have been automatically forwarded to his hotel," Chance said.

Another market that could represent a growing source of revenue for Octel is that of cellular telecommunications providers and the regional Bell holding companies, which are starting to provide voice mail services, Chance said.

Steve Levy, a senior technology analyst at the New York office of investment banking firm Hambrecht & Quist, Inc., praised Octel's selection of Chance to guide the company through potentially lean times.

"Chance brings a level of operations experience to Octel that the company will need to reach higher revenue plateaus," Levy said. "This shows that the leadership of Octel is smart enough to bring in a senior manager before they have problems. Other companies in the communications business hit the wall and then start looking for a new CEO." ◘

Industry Briefs

continued from page 9

PictureTel, Compression Labs post gains. PictureTel Corp., a Peabody, Mass., videoconferencing equipment firm, last week reported its first profitable quarter for the three months ended Sept. 29. PictureTel reported third-quarter earnings of $326,000, a turnaround from a loss of $941,000 in the third quarter last year. Revenue more than doubled from $4.5 million for the third quarter of 1989 to $9.7 million in 1990.

Compression Labs, Inc. also last week posted substantial revenue and earnings gains, attributing the uptick to income from orders by The Boeing Co., IBM, General Electric Co. and Hewlett-Packard Co.

Earnings for the fiscal third quarter ended Sept. 30 shot up 287% to $673,000 on revenue of $13.5 million, which was up 87% over the comparable quarter last year.

Infonet buys stake in OSI firm. Infonet Services Corp. recently said it has acquired a 67% interest in OSIWARE International, an Open Systems Interconnection software firm in Paris. Financial terms of the agreement were not disclosed.

Under the agreement, OSIWARE International's core development team in Vancouver will help Infonet develop messaging services, including an X.500 directory service. Infonet will give OSIWARE International technical and marketing support.

UB to sell Tiara 10BaseT gear. Ungermann-Bass, Inc. recently signed a multiyear OEM contract with Tiara Computer Systems, Inc. that is worth more than $1 million. Under the agreement, Ungermann-Bass will sell 10BaseT adapter cards jointly developed by the two firms.

FCC grants PCN license. Local Area Telecommunications, Inc., a microwave-based alternative access carrier, last week said the Federal Communications Commission has granted it an experimental license to operate a personal communications network in the New York and Newark, N.J., metropolitan areas. The license is effective until May 1992. ◘

Software firms form group to raise ethics

continued from page 9

said member organizations voluntarily agree to refrain from product announcements until the product is in beta test with customers.

Vendors must allow no more than nine months to commercial availability.

Truth in advertising

The White Paper also urges members to accept truth-in-advertising guidelines set by other trade organizations, such as Business/Professional Advertising Association and ABCD: The Microcomputer Industry Association.

On the issue of misleading product benchmarking claims, the report stated that vendor-produced results may not be duplicated by others.

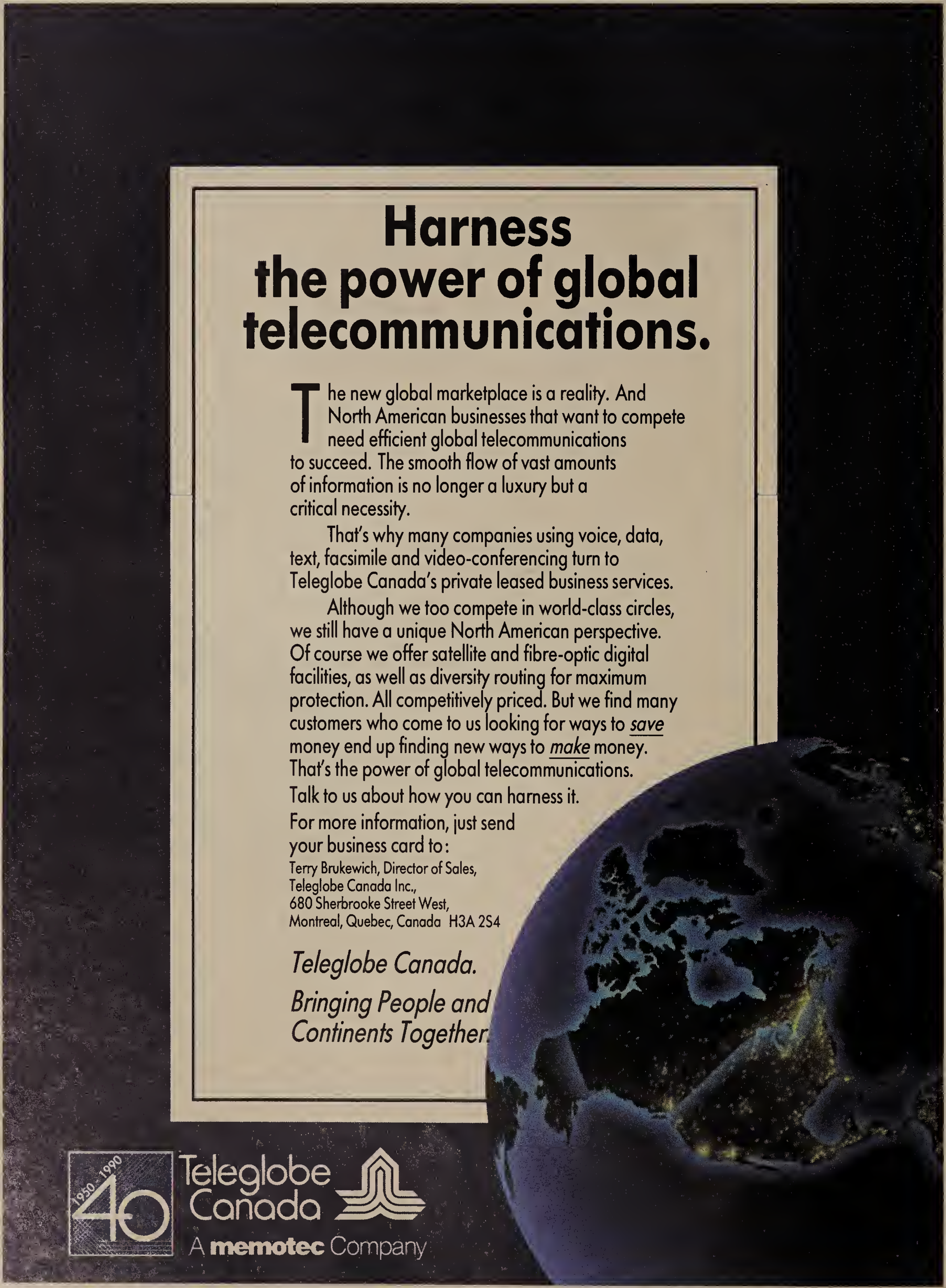
It recommends that vendors adopt two benchmarking standards, TPC-A and TPC-B, established by the nonprofit organization Transaction Processing Performance Council as common standards to measure on-line transaction processing and batch-mode data base performance.

To rectify the problem of bloated revenue and R&D reporting, the report called for strict adherence to guidelines established by the Financial Accounting Standards Board and the American Institute of Certified Public Accountants.

While the group's ranks comprise many reputable software companies, some observers pointed out that the absence of IBM is likely to keep other big name vendors from pledging their support.

In fact, Computer Associates International, Inc. reportedly backed out when it learned IBM had not jumped on the bandwagon.

Notable network software companies, including Microsoft Corp., Novell, Inc. and 3Com Corp., for instance, have yet to join the fray. ◘



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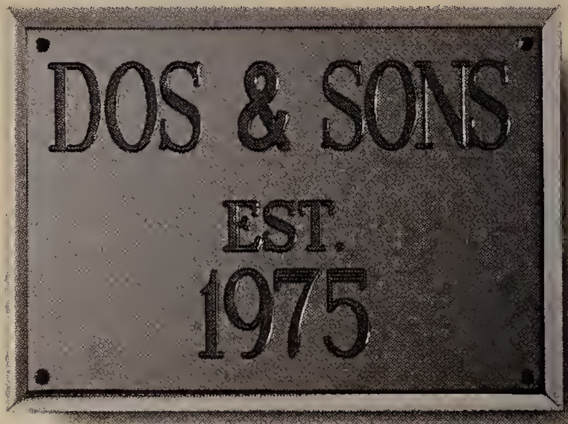
It's a full line of network software products that will put people in touch with all of the information they need to do their jobs.

New LAN Manager 2.0 and SQL Server 1.1 are now available from Microsoft.

But our network is more than just software, it's a business connection. And one which is based on an important set of principles. Seven to be exact.

The First Principle: Connect with all of the right products.

Like Microsoft LAN Manager version 2.0, Microsoft SQL Server version 1.1, and DCA®/Microsoft Communications Server version 1.0. Used together or in combination with all our desktop applications, these products provide the building blocks for a strategic networking software solution.



We created the first software which helped establish the personal computer industry.

Or in simpler terms, information can be shared and exchanged company wide. From every desktop. With speed, reliability and security.

The Second Principle: The strongest connections are those that stand up to the test of time.

Which is why our network is based upon our history as the leading developer of industry standard operating systems.

We back our products with one of the strongest support and service plans in the computer industry.

First, we created MS-DOS®, an operating system so successful 50 million PCs run on it today. Then we introduced the Microsoft Windows™ environment. Perhaps the easiest to use, and therefore the most productive PC environment.

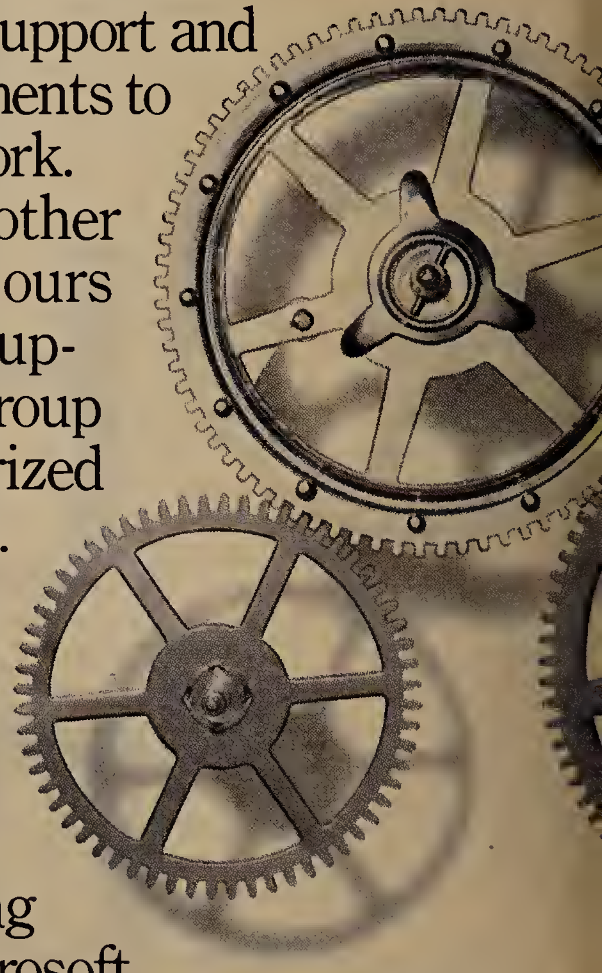
Finally, there's OS/2. The operating system we co-developed with IBM for today's most demanding PC requirements.

So it should come as no surprise that our network is not only the most advanced, but also the most compatible with our industry standard operating systems.

The Third Principle: A good connection is there when you need it.

Support and service are key elements to the Microsoft network. That's why unlike other network products, ours are only sold and supported by a select group of Microsoft Authorized Network Specialists. Extensively trained by our experts.

In addition, we offer a solid Customer Satisfaction Program. Along with training at Microsoft University and convenient



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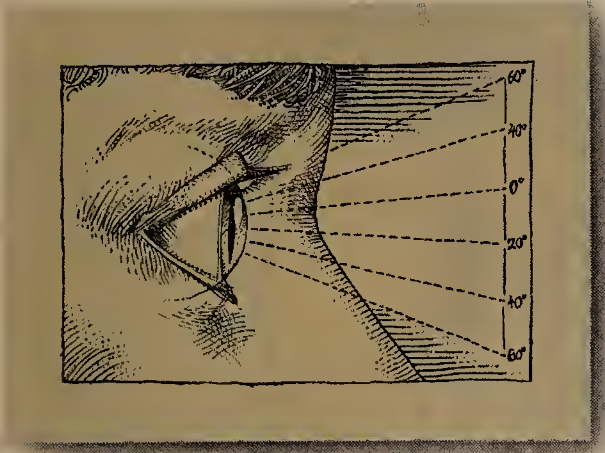
ctions.

contact by phone, fax, or even modem.

The Fourth Principle: Make sure to connect to a company with a clear vision.

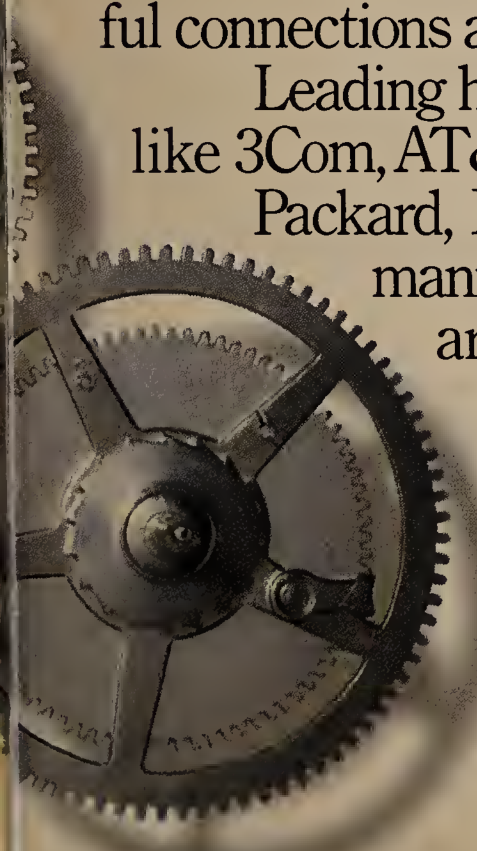

Our vision is to make it as easy to work on a network as it is to work alone.

In 1975, Microsoft was founded on a vision. To put a computer on every desk in every home and office in the world.

To bring this vision to life, we developed a wide range of programs that are much easier to use.

Now we're adding another dimension. To make it easy for computers to connect with each other through advanced standard network products that already have broad industry support.

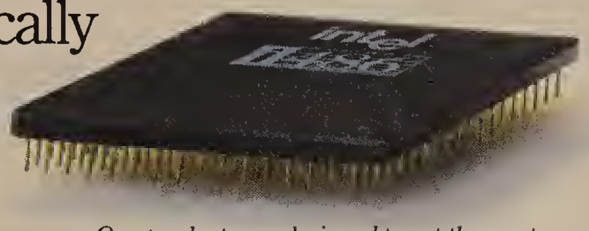
The Fifth Principle: Powerful connections are well connected.



Leading hardware vendors like 3Com, AT&T, DEC, Hewlett-Packard, IBM, NCR, Ungermann-Bass and others are now selling our LAN Manager.

While a number of top software developers have written applications for our products, including Lotus, Oracle, Sybase, and Borland.* In other words, you're assured of a solution that will meet your particular needs.

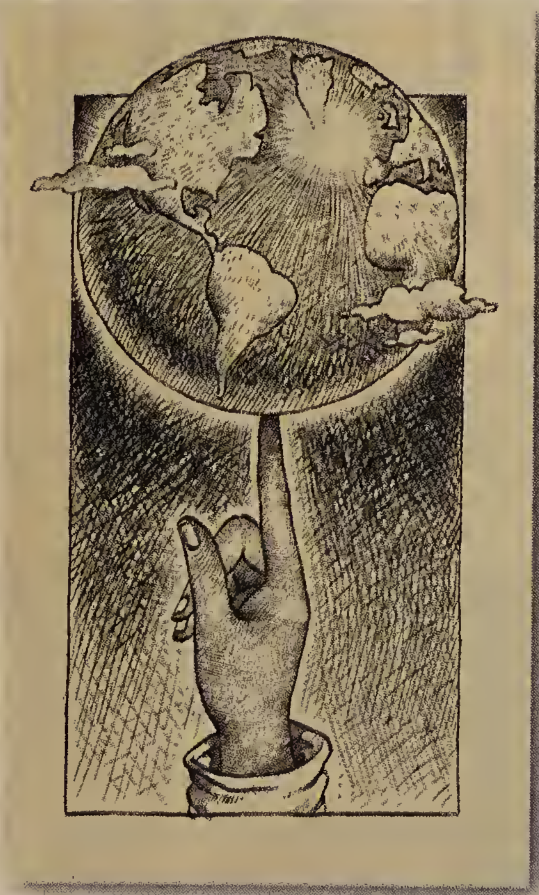
The Sixth Principle: A connection should keep you one step ahead.


Our products are designed to get the most out of today's more powerful PCs.

Our network software products are technologically innovative. Whether it's the pioneering client-server architecture of LAN Manager 2.0, or the safe access of mission-critical information from SQL Server 1.1.

Ultimately, these features let you downsize your mini and mainframe applications onto your PCs. So you can now maximize your computing investment at a considerable savings.

The Last Principle: The right connection will make you an informed source.


Our network will put a world of information at everyone's fingertips.

Our goal is to put a world of information right at the fingertips of everyone in your company. The Microsoft network lets you achieve that, with as much control and as little effort as possible. After all, if you want your business to prosper, everyone has to be well informed.

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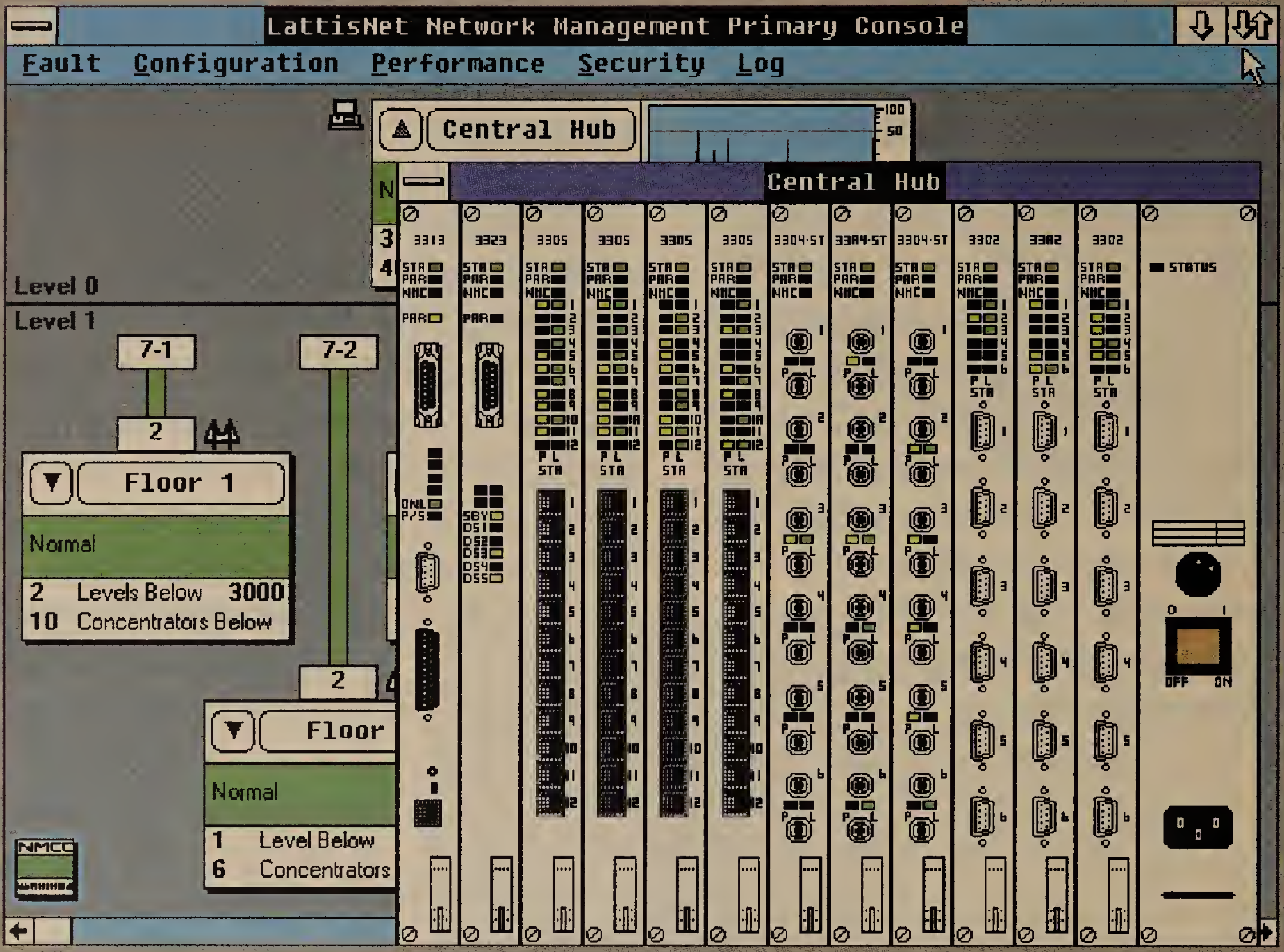
MAXIMIZE NETWORK UP-TIME



The expanded view features a detailed, real-time display of a LattisNet System 3000 concentrator.

IN REAL TIME.

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An expanded view feature offers a detailed, real-time display of your LattisNet concentrators, allowing you to manage individual network connections. Problem segments and nodes can be partitioned from the network to avoid catastrophic failures and maintain high service levels.

LattisNet Network Management lets you learn about the network from the network itself. User-definable thresholds let you determine acceptable activity and error levels for the network. If a threshold is crossed, the system alerts you immediately, keeping you one step ahead of potential problems. And best of all, LattisNet Network Management captures and stores vital information for future analysis and network planning.

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See The FAXNeT Form on Page 27

TELECOMMUNICATIONS

CARRIER SERVICES, CENTREX, CPE, WIRING SYSTEMS AND BYPASS

Worth Noting

"When we negotiated our Tariff 12, we forgot to add a clause saying we could renew the arrangement when it expired. This is something all users should include in their contract. We had to go back and add it in later."

A telecommunications director for a corporation in the Northeast who requested anonymity.

Carrier Watch

Michigan Bell Telephone Co. last week announced it signed a seven-year contract with Flint Community Schools of Flint, Michigan, for 1,200 lines of digital Centrex, of which 125 will be Integrated Services Digital Networks Basic Rate Interface (BRI) lines.

The Bell operating company replaced an aging AT&T Network Systems 1AESS analog central office switch with a new 5ESS digital switch at its Flint main switching center as part of the project. The new switch will initially be used only by the school system.

The contract represents Michigan Bell's first ISDN sale to a secondary education unit. Service is being provided on a customer-specific arrangement at off-tariff rates.

Michigan Bell began cutting over the digital Centrex lines early last month and will cut over the BRI lines during Thanksgiving week. The BRI lines will initially be used simply for voice, with each B channel supporting one telephone set.

US Sprint Communications Co. last week announced a multimillion-dollar service contract from the National Collegiate Athletic Association (NCAA) that makes US Sprint the user's exclusive

(continued on page 18)

AT&T's Software-Defined Network Expanded Volume Pricing Plan

Option	Term	Minimum annual usage (millions of minutes)	Maximum discount
I	1 or 2 years	5	20%
II	4 years	2	20%
III	4 years	50	25%
IV	4 years	200	32%
V	4 years	10	23%
VI	4 years	15	27%

AT&T offers discounts in addition to those listed above as part of ad hoc promotions. The Software-Defined Network service, which will be 5 years old next month, will support roughly 600 customers by year end.

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: AT&T, BASKING RIDGE, N.J.

AT&T garners long-haul contracts worth $5 million

Signs on Lennox International, TrustHouse Forte.

By Bob Wallace
Senior Editor

BASKING RIDGE, N.J. — AT&T last week announced long-distance service contracts totaling almost $5 million with two users, Lennox International, Inc. and TrustHouse Forte PLC.

Under its multimillion contract with Lennox Industries, AT&T will provide a Software-Defined Network (SDN) that will link together the company's Richardson, Texas, headquarters with 180 company sites across the country. Also included in the deal was a new Definity Generic 1 private branch exchange and an Audix voice processing system.

SDN "not only offers significant savings on long-distance, but helps us be more efficient with staff and customer communications," said Lennox Executive Vice-President Richard Booth.

In a separate development, AT&T said it landed a one-year, $3.4 million contract to provide long-distance, operator and pay phone services to TrustHouse Forte's Travelodge hotel chain.

AT&T will provide long-haul services and 24-hour operator services for calling card, person-to-person, billed-to-third-party and collect calls from more than 5,500 hotel room telephones and public pay telephones at the 231 Travelodges across the country.

An additional 200 independently owned properties will have the option to offer AT&T service to their guests under the contract, according to an AT&T spokesman.

"We are constantly looking at ways to enhance our guest services," said Bill Hanly, executive vice-president of sales and marketing for TrustHouse Forte Hotels. "AT&T long distance provides our guests [with] the quality they have come to expect from Travelodge."

Travelodge is the 16th largest hotel chain in the country. AT&T says it provides long-distance service to 17 of the 20 largest U.S. hotel and motel chains.

RCI offers simplified calling rates

RCI Corp., a national carrier headquartered in Rochester, N.Y., recently announced Simplicity, a new long-haul service with a simplified rate structure.

Designed for use by midsize and large users, Simplicity uses one rate for calls made to sites in the Northeast and another for calls made to the rest of the U.S.

Users pay .17 cents for each six-second increment of daytime calls and .13 cents per six seconds of evening/night-weekend calls to locations in Delaware, Maryland, the six New England states, New Jersey, New York, Ohio, Pennsylvania and Virginia, and to parts of Kentucky, Illinois, Indiana and Michigan.

Users pay .22 cents for each six-second increment of daytime calls and .17 cents per six seconds of evening/night-weekend calls to sites in all other states.

Simplicity does not carry any minimum usage requirements or account fees, according to a spokeswoman for the company. As a special introductory promotion, RCI is offering new customers a credit of as much as $100 on their third bill.

ANI helps company speed call handling

Project manager stresses, however, that ISDN is just a tool, not the last word on customer service.

By Bob Wallace
Senior Editor

ATLANTA — Ciba Vision Corp.'s use of Integrated Services Digital Network automatic number identification (ANI) has enabled the company to shave 10 seconds off the average time needed to process each customer call.

Despite this benefit, Edward Buckley, customer systems project manager for Ciba Vision, stresses that ANI is only part of the customer service puzzle, not a solution.

"ISDN technology allows calls to be processed quicker and allow accounts to get through faster, but it's not even close to being what's really important to our customers," Buckley said. "It has to be backed up with after-the-call service to make sure the order is processed, shipped quickly and sent to the customer on time."

Ciba Vision's Contact Lens Division began using ANI in May to handle the 6,000 calls that come into its 47-agent telemarketing center here daily.

When optometrists, eye care retail stores and other customers call Ciba Vision's 800 number to order products, their calls are passed from an AT&T 4ESS central office switch over one of two AT&T-provided Primary Rate Interface (PRI) links to an AT&T System 85 private branch exchange configured as an automatic call distributor (ACD). Ciba Vision receives ANI with 88% to 90% of all calls sent over the PRI links, Buckley said.

The ACD passes ANI data over an X.25 link to an AT&T 3B20 minicomputer running AT&T ISDN gateway software, which reformats the information for a customer service application on Ciba Vision's IBM Applications System/400 minicomputer.

The gateway creates messages such as arrival and connection records. The arrival records contain the ANI, the trunk on which the call is arriving and the dialed

(continued on page 18)

WASHINGTON UPDATE

BY ANITA TAFF

Barrett expresses price cap reservations. Commissioner Andrew Barrett broke rank with his Federal Communications Commission colleagues last week by issuing a statement of concern about the agency's efforts to implement price caps for the local carriers. Barrett said he has no faith that the price cap plan will help the agency prevent carriers from cross-subsidizing services.

"I want to emphasize that my support for this [price cap] order is not based on the notion that price cap regulation prevents cross-subsidies," Barrett said in a one-page statement. "I do not believe that price cap regulation alone removes either the potential or the actual ability of the [local carriers] to cross-subsidize services," he said.

Supporters of price caps, including some at the FCC, have argued that, since the plan separates carriers' services into different categories and regulates price changes for each category independently, it would be difficult for carriers to cross-subsidize between services.

Barrett argued last week that the root cause of cross-subsidies in the industry is beyond the reach of new price cap rules.

He contends that fundamental practices, such as the way carriers divided costs between local and long distance, or regulated and unregulated services, led to accounting abuses.

Barrett's statement was apparently prompted by the release, earlier this month, of the full text of the FCC's decision to implement price caps for the seven regional Bell holding companies and GTE Corp. telephone operating companies.

Although the statement is dated Oct. 4, it was not released until Oct. 15. No explanation was given for the delay.

Now that ev afford a Macintosh, whic

This is all of them. From left to right: The new Macintosh Classic, the well-established Macintosh SE/30, the Macintosh Portable, the new Macintosh LC, the new Macintosh IIsi, plus the Macintosh

In 1984, Apple introduced the first Macintosh® on the simple premise that people shouldn't have to learn to work with computers. Computers should learn to work with people.

Today, Macintosh is still the only computer system designed from the chip up on this principle.

Meanwhile, other computer companies are scrambling to make their conventional technologies emulate what is still unique about Macintosh. But no other personal computer comes close to matching the record of stability, consistency, and innovation enjoyed by the Apple Macintosh.

At $999,* the computer people actually use can be used by a lot more people.

We're now introducing three new Macintosh personal computers. At prices that make powerful computer technology not only accessible, but affordable as well.

Together, they put much of the power of our most advanced computers into our least expensive ones.

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It has everything that makes a Macintosh a Macintosh.

Built-in networking. A SuperDrive™ disk drive, which reads both Macintosh and MS-DOS files.

And a $999* price that includes the built-in monitor, 1MB of RAM, keyboard, mouse, and system software.

The 40MB hard disk is optional.

Its processor is an 8 MHz 68000 chip. And it outperforms even its popular predecessor, the Mac® SE.

The charts shown use figures included in a 1990 study conducted by Diagnostic Research, Inc., among Fortune *1000 MIS managers familiar with Macintosh and MS-DOS or Windows systems. Call and we'll send you*
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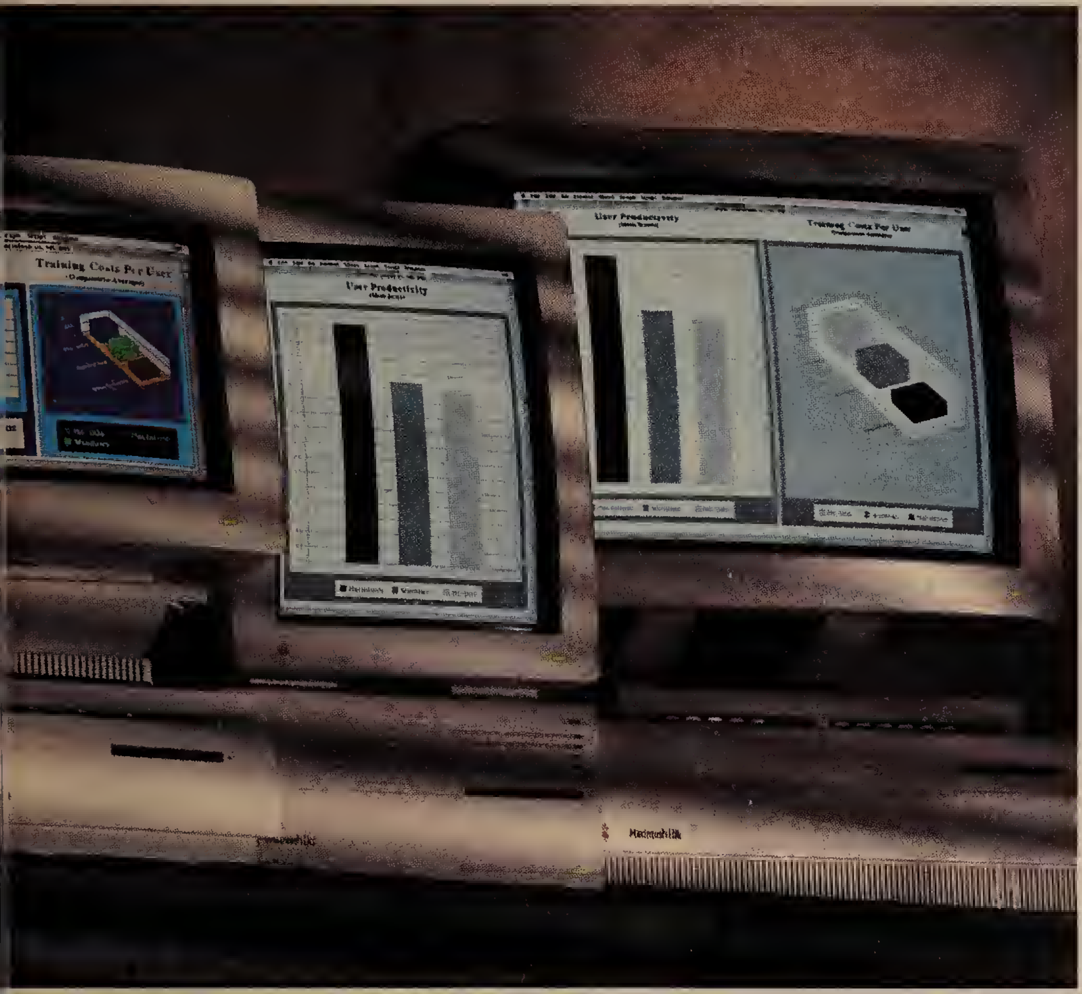

IIci, and the Macintosh IIfx. Have we left anybody out?

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The new, low-cost Macintosh LC introduces the exquisite quality of Macintosh color and graphics to a new, wider world.

With its 16 MHz 68020 processor, it runs all the thousands of Macintosh programs at impressive speed. And, with an optional Apple® IIe Card, it runs thousands more Apple II applications as well. The Macintosh LC expands by adding a card to its standard slot. A 40MB internal hard drive is standard.

A built-in video chip runs either an Apple monochrome or low-cost color monitor—without adding a video card.

And the Macintosh LC, like the Mac IIsi, even lets you record your voice and other sounds into the computer.

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The Macintosh IIsi is a powerful building block for business. With a 20 MHz 68030 microprocessor, it delivers serious number-crunching at the most attractive possible price.

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ANI helps company speed call handling

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number identification service, which is the last four digits of the 800 number the caller dialed.

The arrival records are forwarded to the minicomputer along with a connection record telling it to which agent the call is being transferred. The processor matches the ANI to a customer profile and transmits the file to the agent's terminal.

Customer files on the AS/400 data base had orginally been set up by area code and telephone number. This saved Ciba Vision's MIS department hours of reindexing the files so that they could be referenced by ANI, Buckley said. "Thankfully, we didn't have to [rework] our data base when we made the transition to ISDN," he said. "This helped us get the project through the systems department."

Before Ciba Vision began using ANI, incoming calls were routed through queues to an agent who asked callers for their area code and telephone number. Agents keyed in the information and waited for delivery of the appropriate customer profile. Now, when Ciba Vision agents hear a beep to indicate an incoming call, they need only press the enter key to display the customer profile on their terminal screen, Buckley said. The call arrives shortly thereafter.

Before selecting AT&T as its ISDN carrier, Ciba Vision tested ISDN PRI services from MCI Communications Corp. and US Sprint Communications Co.

Ciba Vision passed on US Sprint's offer largely because of billing problems it had with the carrier. AT&T was chosen over MCI because Ciba Vision has a good long-standing relationship with AT&T.

Ciba Vision and its customers are pleased with AT&T's ISDN service and plans to use ANI in new ways to further enhance customer service, Buckley said.

In addition to processing customer calls faster, Ciba Vision plans to begin using ANI data from customers who hang up before reaching an agent to enable the firm's 20 outbound telemarketing agents to return calls after peak calling periods, Buckley said. The company will join a growing list of large corporations, including Bausch & Lomb and Union Pacific Railroad Co., when it begins performing "callbacks" early next year.

As was the case with Bausch & Lomb and Union Pacific, it was the customer service manager who championed the use of ISDN at Ciba Vision.

"ISDN is a lot like EDI: It's not something the technology people or the executives drive; it's a technology that the customer service group sees as offering an advantage and [implements]," Buckley said.

The company, which will transfer its ISDN operations to a new corporate headquarters 50 miles north of Atlanta in the third quarter of 1991, plans to increase the number of agents using ISDN from 47 to about 80 during the next three years, Buckley said.

Carrier Watch

continued from page 15

long-distance provider. The NCAA will use US Sprint's domestic and international long-distance voice services, 800 and 900 service offerings and teleconferencing service. US Sprint would not divulge the value or length of the contract.

The NCAA is already using a US Sprint 900 number to provide ticket information for the 1991 basketball championship games.

Metropolitan Fiber Systems (MFS) of Chicago, Inc. last week installed new switching equipment and transmission systems at its network control center in Chicago.

MFS now uses AT&T's DDM T-3 multiplexer and Rockwell Telecommunications, Inc.'s fiber transmission systems.

The 1,187-fiber-mile MFS of Chicago network now serves customers in roughly 42.1 million square feet of office space in 45 buildings.

The alternate access carrier plans to extend its fiber network in Chicago to serve nine additional buildings by year end.

In a separate announcement, the company said it has expanded its bypass network to serve additional buildings — three of which are located in Baltimore, one in Boston, two in Houston, three in Los Angeles, one in Minneapolis and three in Philadelphia.

MCI Communications Corp. recently submitted a proposal to the Federal Communications Commission to regulate the telemarketing industry. The five-point plan demands that telemarketing salespeople properly identify themselves and their products, with the disclosure that a separate verification call will be made if the person called wishes to change his long-distance carrier.

MCI suggested that the FCC should adopt rules allowing free and convenient return to the original carrier. The MCI proposal on telemarketing follows one from AT&T that advocates rules requiring a customer's written authorization to change carriers. AT&T has accused MCI of "slamming," the telemarketing practice of switching a customer to another carrier without authentic authorization.

An MCI spokesman, who said that MCI is probably the largest user of telemarketing among the long-distance carriers, acknowledged that MCI has committed slamming violations but that it's a widespread practice in the industry. He added that MCI does not support AT&T's call for written authorization.

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See The FAXNeT Form on Page 27

DATA COMMUNICATIONS

PRODUCTS, SERVICES, ARCHITECTURES, STANDARDS AND NETWORK MANAGEMENT

Worth Noting

> "We're well aware that we've gone about as far as we can go with the technology we have."

Max Hopper
Senior vice-president
Information systems
American Airlines, Inc.
Speaking about the SABRE computer reservation network at the recent Nina Lytton Executive INTEROP conference in San Jose, Calif.

Data Packets

Data General Corp. recently unveiled Open Systems Interconnection File Transfer, Access and Management (FTAM), Virtual Terminal and OSI/Platform software for its AViiON line of Unix-based servers and multiuser computer systems.

DG said its new Virtual Terminal Protocol For AViiON Systems software, which complies with the Government OSI Profile 2 specification, is the first offered by a computer system vendor. The software lets AViiON users log on to a remote host and emulate a host-attached terminal. It supports two terminal profiles — Telnet and Transparent — which describe the functions supported on a terminal. Transparent is the lowest common denominator profile that provides only basic terminal functions.

DG's FTAM for AViiON Systems software, like the Virtual Terminal software, works over X.25 or 802.3 Ethernets. It provides file management and transfer functions between AViiON users and other machines that support the protocol.

DG's OSI/Platform for AViiON systems provides the base OSI protocols on which other DG or user-written OSI applications run.

The OSI/Platform software is priced from $550 to $1,550, the Virtual Terminal software is priced between $800 and $2,500, and the FTAM software costs between $1,000 and $3,000. All are available now.

Firm adds dial-up, VPN-like capabilities to TCP/IP net

PSI will also market its X.500, SNMP software.

By Paul Desmond
Senior Editor

SAN JOSE, Calif. — Performance Systems International, Inc. (PSI) recently announced upgrades to its public TCP/IP network that include dial-up access and a new virtual private network service.

PSI runs PSINet, a public, value-added network that provides Transmission Control Protocol/Internet Protocol and Open Systems Interconnection internetworking services.

At the INTEROP 90 Conference and Exhibition here, the company announced a new Virtual Private Internetworking service that is analogous to voice virtual private networks offered by carriers. It lets users carve out a portion of PSINet and configure it as a private network without incurring the cost of building and managing the net, said Martin Schoffstall, vice-president and chief operating officer of PSI.

Besides TCP/IP and OSI, which are the only protocols supported by PSINet, the VPI service also supports Apple Computer, Inc.'s AppleTalk, Novell, Inc.'s Integrated Packet Exchange (IPX) Xerox Corp.'s Xerox Network Systems and Digital Equipment Corp.'s DECnet protocols.

The VPI service is configured as a closed user group on PSINet, meaning it is not open to access from PSINet users or users of the Internet, which is attached to PSINet, Schoffstall said.

PSI also announced its new Dialup Connection Service, a dial-up access service for PSINet that is expected to be available in 60 cities by mid-1991.

"Up to now, TCP/IP has been dominated by leased lines and routers," Schoffstall said. With the new service, users of V.32 and V.42 modems or X.25 equipment can access PSINet.

The dial-up service is also accessible to the VPI service but only for TCP/IP users. The dial-up service is available now in Albany, N.Y., Boston, New York, Santa Clara, Calif., and Washington, D.C. for a flat rate of $250 per month.

PSI also announced it is expanding PSINet from its current 20 points of presence (POP) to 40 POPs, which will serve 60 cities. Schoffstall said the company is rolling out new POPs at the rate of three every two months and expects to have dial-up access at all of them.

In addition to its public networking services, PSI also sells some of the software it developed for its network. At INTEROP, the company announced it will market its X.500 and new Simple Network Management Protocol (SNMP) software to end users.

(continued on page 22)

X/Open extends focus to net interoperability issues

By Paul Desmond
Senior Editor

SAN JOSE, Calif. — X/Open Company, Ltd. recently announced six new open systems specifications that extend X/Open's scope from application portability to networking issues.

Until now, X/Open has specified standards that addressed the portability of applications between different computers. With the new round of specifications, X/Open is now addressing interoperability issues that promise to help applications running on machines from different vendors work with one another.

X/Open is a nonprofit group of system vendors that has specified a series of de facto and international standards in its X/Open Portability Guides (XPG).

Of the six new specifications announced at the INTEROP 90 Conference and Exhibition here, four address networking issues, according to Mike Lambert, chief technical officer for X/Open.

The first is Protocols for X/Open PC Internetworking, which specifies the use of Sun Microsystems, Inc.'s Network File System to let personal computers access data on an existing network of Unix computers.

The second is Distributed Transaction Processing, a software specification developed from scratch by X/Open that defines verbs application, which developers can use to control a data base management system in a transaction processing environment. The specification details an application program interface between a transaction processing application and an underlying SQL data base.

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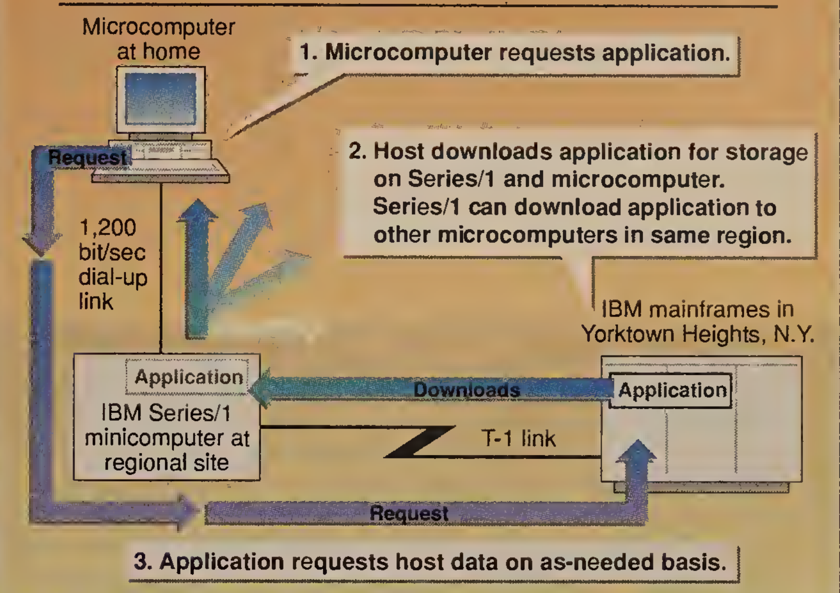
Distributing applications Prodigy style



Microcomputer at home
1. Microcomputer requests application.
2. Host downloads application for storage on Series/1 and microcomputer. Series/1 can download application to other microcomputers in same region.
Request
1,200 bit/sec dial-up link
IBM mainframes in Yorktown Heights, N.Y.
Application
IBM Series/1 minicomputer at regional site
Downloads
Application
T-1 link
Request
3. Application requests host data on as-needed basis.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: PRODIGY SERVICES CO., WHITE PLAINS, N.Y.

Distributed network pays off for Prodigy

Distributed processing approach helps service provider reduce net traffic, speed info requests.

By Barton Crockett
Senior Editor

WHITE PLAINS, N.Y. — As Prodigy Services Co. embarks on a major nationwide expansion of its videotex service, the company is relying on distributed processing to reduce network traffic volumes and speed transaction processing.

Prodigy is betting that its six-year effort to separate individual applications into modules and objects that can be distributed, stored and processed on a user's microcomputer will help push as much processing as possible down to the local level and reduce the number of queries sent back from users' microcomputers over asynchronous, 1,200 bit/sec dial-up links into local Prodigy nodes.

"It's key to break up the applications into components," said Gerry Mueller, vice-president of systems operations and telecommunications at the videotex service provider. "We need to do that to overcome the limitations of the local link."

Founded in 1984 as a joint venture of IBM and Sears Roebuck and Co., Prodigy began providing services on a limited basis in 1988 to users in a few major cities. Earlier this month, the company announced plans to expand service availability throughout the nation by letting users access Prodigy via the BT Tymnet, Inc. public network.

Pioneer in the field

According to Mueller, Prodigy executives knew when they designed the videotex network in 1984 that they would have to rely on a distributed processing architecture in order to overcome the limitations of slow local links.

He said that much of the Prodigy development effort was aimed at designing ways to break up applications so that they could be easily distributed down to local microcomputers.

In actual implementation, Prodigy has broken up each of the applications that users access into much smaller modules and objects. These are loaded into a user's microcomputer on an as-needed basis or stored there from session to session if they are used repeatedly.

Prodigy software

In order to subscribe to Prodigy, users must first purchase a software kit, which retails for $49.50.

That software loads the user's microcomputer with communications software and customized software that maintains a consistent Prodigy user interface. It also reserves up to 950K bytes of memory storage space for frequently used application modules and objects. This memory space is called a staging area.

One example of how applications are broken up on Prodigy is the EAAsy SABRE travel reservation system, which is divided into 15 different modules.

One module is the screen that presents users with available flights and departure times. Another module shows available hotels, while another shows available rental cars. Other modules are used to book reservations. Objects are the actual reservation information items contained within the modules.

(continued on page 22)

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Announcing NCR Open Networking Environment.™

NCR's new Open Networking Environment demonstrates our commitment to a standards-based networking strategy by providing the first set of end-to-end products based on Open Systems Interconnection (OSI).

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And more.

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Firm adds dial-up, VPN-like capabilities

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PSI will sell the source code for the X.500 application it uses to run its PSINet directory. For academic or government users, the software costs $850; for commercial users, it is available for $8,500, Schoffstall said.

The software runs under Unix and provides a white pages-type directory that helps users find computer addresses of other users on the same or attached networks. It uses a graphical interface based on the X Window System.

PSI's new release of its SNMP Network Management Station software provides support for the management of a wider array of devices and services than previous versions. It includes an implementation of the second version of the Internet Management Information Base (MIB II), which is the most current MIB available.

Also included are new experimental MIBs, including one that uses SNMP and the extended superframe format to manage T-1 and T-3 lines, and applications for monitoring channel service units and terminal servers. Those MIBs are awaiting approval from the Internet Engineering Task Force.

For single-site, internal-use licenses, the SNMP source code costs $8,500 for commercial users and $850 for academic and government institutions. Multiple-site licenses cost $25,000, and redistribution licenses cost $50,000. ◻

X/Open focuses on interoperability

continued from page 19

The third specification is Byte Stream File Transfer, which lets users access an Open Systems Interconnection File Transfer, Access and Management (FTAM) application using the same command structure as the File Transfer Protocol (FTP) used in Transmission Control Protocol/Internet Protocol networks.

"We've chosen the familiar FTP syntax rather than invent a new one because we think it will encourage migration," Lambert said.

The fourth specification is actually a study of existing OSI profiles that have already been developed, such as the Government OSI Profile in the U.S. X/Open compares the main features of each and draws conclusions on trends and developments in order to help users choose which profile best fits their needs.

X/Open also announced it has devised three release levels for its specifications that effectively put the specifications into developers' hands earlier.

"The strategy allows early access to everything we do to everybody who wants to know," Lambert said. Previously, specifications were available only to X/Open members until published in an XPG.

All of the new specifications are available now for $40.

X/Open can be reached by writing to 1750 Montgomery St., San Francisco, Calif. 94111, or call (415) 773-5383. ◻

Distributed network pays off for Prodigy

continued from page 19

When Prodigy users first log on to EAAsy SABRE, each application module is downloaded to their microcomputer as it is requested. If the module is used frequently, it is stored in the staging area, which eliminates the need to download it across the public network each time the user logs on. The module then requests the individual data objects that will be shown to the user from the Prodigy net.

These requests are carried from local Prodigy nodes, which consist of either BT Tymnet nodes or IBM Series/1 minicomputers, to Prodigy's national T-1 backbone network and then into the central Prodigy data center in Yorktown Heights, N.Y. The data center retrieves EAAsy SABRE reservation data via dedicated gateway links to the main SABRE processing center in Tulsa, Okla.

Reducing net traffic

According to Mueller, this architecture reduces net traffic by having applications processed locally on microcomputers, rather than remotely on Prodigy mainframes. This, in turn, reduces Prodigy expenses by lessening demand for backbone network capacity and mainframe processing power.

Network traffic is even further reduced by storing individual application modules in a local Prodigy Series/1 processor whenever possible. Mueller said that when an application module is first requested by a user, it is stored in local Series/1s so that when the next user requests the application module, the request does not have to flow back to the Prodigy data center.

After a period of time, if the application module is not requested, it is deleted from memory. If the application module is changed, an update is distributed to the local node over the backbone network.

Prodigy further speeds processing times by preloading modules and objects into users' microcomputers before they are requested.

For example, each time a user logs on to Prodigy, a list of advertisements is sent down to that user's local Prodigy node and microcomputer. While one advertisement flows across the bottom third of the user's screen, the microcomputer puts out a request for the next ad to be downloaded. The ad can be quickly called up without any extra delay from the network link.

According to Mueller, Prodigy also uses this preloading technique to speed distribution of news and weather information to users. ◻

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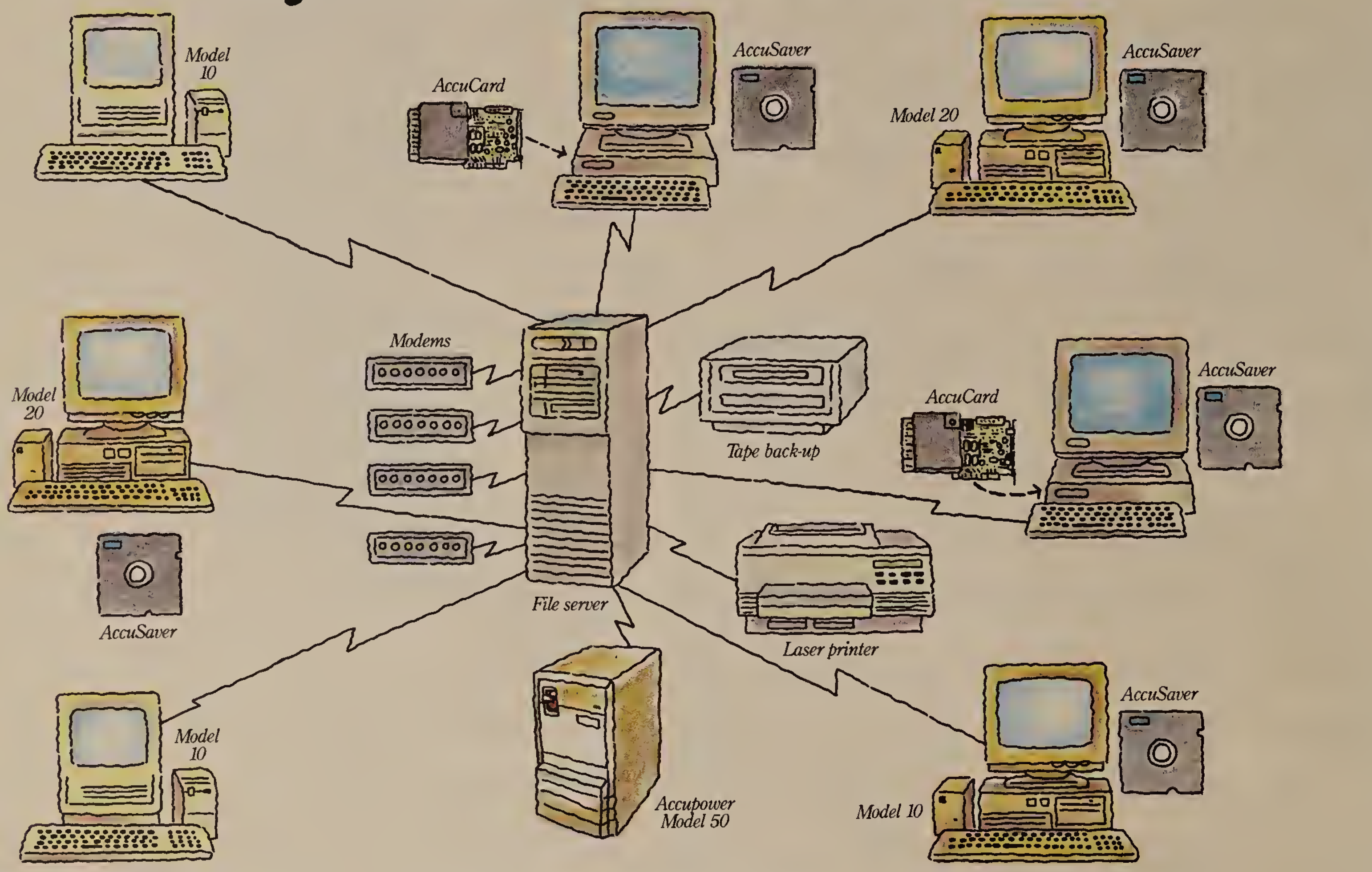

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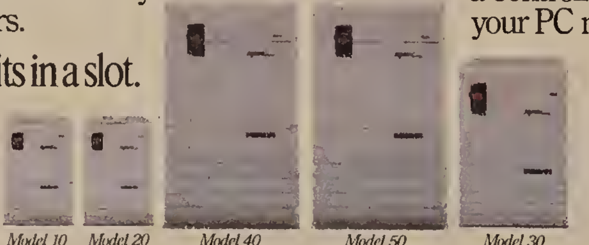

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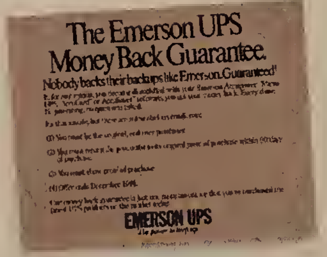

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LOCAL NETWORKING

PC AND TERMINAL-TO-HOST LANS, GATEWAYS AND MICRO COMMUNICATIONS PRODUCTS

Worth Noting

In 1990, Access/One LAN hub products accounted for 50% of the revenue of Ungermann-Bass, Inc. In 1989, Access/One accounted for 30% of the company's revenue. Ungermann-Bass does not report revenue separately from its parent, Tandem Computers, Inc.

Netnotes

Advanced Computer Communications (ACC) announced at the recent INTEROP 90 Conference and Exhibition in San Jose that its Series 4000 line of bridge/routers has been enhanced to support routing of data based on Novell, Inc.'s Internetwork Packet Exchange (IPX), and the Xerox Corp. and Ungermann-Bass, Inc. implementations of the Xerox Network Systems protocol.

The Series 4000 previously routed Transmission Control Protocol/Internet Protocol and Digital Equipment Corp. DECnet protocols, while bridging all other protocols.

The Series 4000 family consists of the ACS 4100, which offers a single Ethernet port and two wide-area network ports, and the ACS 4400, which provides as many as four Ethernet and eight WAN connections.

The IPX and XNS support is offered in a new version of the bridge/router software. Current users can receive a free upgrade.

ACC also announced the addition of IP routing to its ACS 2100 Local Ethernet bridge, enabling TCP/IP packets to be routed between Ethernets while all other protocols are bridged. This enhancement is also offered as a free software upgrade.

ACC can be reached at 720 Santa Barbara St., Santa Barbara, Calif. 93101, or call (805) 963-9431. ◘

Synernetics hub supports Ethernet, token ring, FDDI

The LANplex 5000 can also be used for bridging.

By Tom Smith
Senior Writer

SAN JOSE, Calif. — Synernetics, Inc. recently introduced a local-area network hub that supports Ethernet, token-ring and Fiber Distributed Data Interface LANs, as well as bridging functions.

The LANplex 5000, introduced at the recent INTEROP 90 Conference and Exhibition here, is a high-capacity device intended to be used to support bandwidth-intensive applications or as a hub linking multiple LAN segments.

The machine has 10 internal buses — three dedicated to FDDI, three to Ethernet, three to token ring and a VME bus supporting a Motorola, Inc. 68030-based system processor used for control and management. All 10 buses share a common backplane, meaning chassis modules can be plugged into any slot.

Synernetics stuffed the box with buses to maximize performance, according to Tom Medrek, a product manager at Synernetics. The three FDDI buses, for example, provide a total of 300M bit/sec of FDDI bandwidth.

Hub modules

As initially released, the only modules available will be for Ethernet and FDDI; token-ring support is a promised enhancement. Each optional interface is based on a Reduced Instruction Set Computer processor.

The FDDI modules include the FDDI Enterprise Access Module and the FDDI Concentrator Module. The Enterprise Access Module provides a dual-attached connection to a 100M bit/sec FDDI ring. It also has two ports for the direct connection of FDDI-equipped workstations. The FDDI Concentrator Module supports four single-attached or two dual-attached workstations.

The Ethernet interface, called the Ethernet Express, combines the functions of an eight-port 10BaseT hub and a bridge. Each of the ports can be used to sup-

(continued on page 24)

David Systems unwraps SNMP net mgmt. system

SAN JOSE, Calif. — David Systems, Inc. recently announced a management system for its Ethernet local-area network hubs based on the Simple Network Management Protocol (SNMP).

Announced at the INTEROP 90 Conference and Exhibition here, David Systems' SNMP implementation has two components. The first is network management station software that runs on a personal computer under Microsoft Corp.'s Microsoft Windows 3.0. The second is a daughterboard with SNMP agent firmware for David Systems' ExpressNet Intelligent Concentrator, a 10BaseT Ethernet hub supporting as many as 132 nodes.

David Systems' SNMP agent software complies with the standard objects defined within the SNMP Management Information Base (MIB), which allows it to be managed by SNMP network management systems. David Systems has extended its MIB by adding objects, and several third-party vendors have pledged support for those objects.

Among the vendors promising support for David Systems' MIB extensions are Advanced Computer Communications and Hughes LAN Systems, Inc. These vendors' SNMP management stations will thus offer functionality equal to that provided by David Systems' management station.

The management station software, called ExpressView Network Management, displays — under the Microsoft Windows graphical user interface — the error, alarm and utilization data gathered by the SNMP agent. It communicates with the agent via the SNMP protocol.

A single copy of the ExpressView software can be used to manage a single LAN. The hubs need to be upgraded with the addition of a daughterboard, known as the Supervisor In-band Communications Module (ICM).

ICM, which supports David Systems' firmware implementation of SNMP, attaches to David Systems' existing Supervisor Module, a management device for the ExpressNet Intelligent Concentrator. The board had supported a dumb terminal linked to the hub via an RS-232 port.

ExpressView software is available now and costs $1,495 per Ethernet managed. ICM, with SNMP agent firmware, costs $795. ◘

Ungermann-Bass bolsters Access/One LAN hub

New products support SNMP, 10BaseT

Product	Function	Price	Available
SNMP agent software	TCP/IP standard network management	Not yet announced	First half of 1991
Access/One 10BaseT Concentrator	12-port 10BaseT Access/One interface	$2,495	Now
Twisted-Pair Access Unit	Thick and thin Ethernet-to-10BaseT converter	$155	Now
Access/PC-8	10BaseT personal computer Ethernet interfaces	$395	Now
Access/PC-16		$545	Jan. 1991
Access/MC		$545	Jan. 1991
Net/One LAT/TCP	Adds DEC LAT support to terminal server	$495	Dec. 1990

LAT = Local Area Transport
SNMP = Simple Network Management Protocol

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: UNGERMANN-BASS, INC., SANTA CLARA, CALIF.

UB boosts features of Access/One hub

Company adds SNMP, 10BaseT and LAT support enhancements to its intelligent LAN wiring hub.

By Tom Smith
Senior Writer

SAN JOSE, Calif. — Ungermann-Bass, Inc. recently introduced several enhancements to its Access/One intelligent wiring hub, including support for the 10BaseT and Simple Network Management Protocol (SNMP) standards.

Ungermann-Bass also announced that the asynchronous terminal server for its Access/One now supports Digital Equipment Corp.'s Local Area Transport (LAT) protocol as well as the previously supported Transmission Control Protocol/Internet Protocol.

The Access/One hub is offered in five- and 11-slot configurations and supports a range of modules, including a variety of Ethernet interfaces, 4M bit/sec token-ring interfaces, and bridge and terminal server modules.

The SNMP support, offered as a software upgrade for the Supervisor Module within the Access/One enclosure, makes the hub an SNMP agent that can be managed by any number of vendors' SNMP management stations.

Ungermann-Bass has tested its SNMP agent implementation for compatibility with SNMP stations from vendors including Advanced Computer Communications, cisco Systems, Inc., Sun Microsystems, Inc. and SynOptics Communications, Inc.

The agent, which can be downloaded from the company's DOS-based Network Management Console to the Supervisor Module, will report errors, alarms and utilization information about all Access/One components to net management stations that support the SNMP protocol.

The Supervisor Module currently supports Courier, an Ethernet network management protocol that is part of the Xerox Corp. Xerox Network Systems protocol. Courier will continue to be supported.

The software will be available in the first half of 1991. The company has not announced pricing.

Ungermann-Bass further enhanced the support for local-area network standards in its product line through the addition of several 10BaseT products, including a 12-port Access/One concentrator, personal computer interfaces and a 10BaseT transceiver.

Ungermann-Bass' Access/One 10BaseT Concentrator is a single-slot Access/One board that functions as a hub for as many as 12 personal computer nodes at distances up to 100 meters.

The $2,495 card adds to Ungermann-Bass' existing Ethernet media support, which includes shielded twisted-pair cabling, fiber-optic cabling, as well as thick and thin Ethernet. The company previously supported unshielded twisted-pair cabling, but these new products are fully compliant with the recently completed 10BaseT standard.

The new transceiver enables nodes with Ethernet interfaces supporting thick or thin coaxial

(continued on page 24)

UB boosts Access/One hub

continued from page 23

cable to be used with unshielded twisted-pair wire. The $155 Twisted-Pair Access Unit is a stand-alone device.

The last component of the 10BaseT line consists of low-end nonintelligent 10BaseT personal computer interfaces. These boards, manufactured by Tiara Computer Systems, Inc., complement the more expensive intelligent 10BaseT interfaces Ungermann-Bass currently offers.

The interfaces are offered for computers based on the Industry Standard Architecture (ISA) and IBM's Micro Channel Architecture (MCA).

The ISA boards — the eight bit Access/PC-8 and the 16-bit Access/PC-16 — cost $395 and $545, respectively. The 16-bit Access/MC MCA adapter is priced at $545. All three interfaces have software drivers for Ungermann-Bass' implementation of OS/2 LAN Manager, called Net/One LAN Manager; Novell, Inc.'s NetWare 286 and 386; TCP/IP; Xerox Corp.'s Xerox Network Systems; and Microsoft Corp.'s Network Driver Interface Specification.

In addition to improved LAN connectivity, Ungermann-Bass also enhanced the Access/One's terminal connection capabilities by adding LAT protocol support to the Asynchronous Interface Module (ASM-100), an eight-port terminal server for the Access/One chassis. Adding LAT support to the terminal server will enable the ASM-100 to support terminal-to-host communications with Unix hosts running TCP/IP and with DEC VAXes running the proprietary LAT protocol.

Ungermann-Bass said the LAT code has been licensed from DEC.

Net/One LAT/TCP, the new software, can be downloaded to the ASM-100 from the Network Management Console. It is scheduled be available in December for $495. ◻

Hub supports E-net, token ring

continued from page 23

port a single bandwidth-intensive Ethernet node or, conversely, an Ethernet segment with multiple nodes. When used to support Ethernet segments, the module can link 256 nodes.

When performing Ethernet-to-FDDI bridging, Ethernet Express translates Ethernet data into FDDI format. This translation allows Ethernet nodes to communicate with other Ethernet nodes accross an FDDI ring or directly to FDDI nodes.

From a bridging standpoint, Synernetics' Ethernet Express differs from other Ethernet-to-FDDI bridges because it is able to connect Ethernet end nodes to the FDDI backbone.

LANplex 5000 pricing starts at $24,900, which includes the chassis, a system processor card and a single Ethernet Express interface. Additional Ethernet Express cards cost $11,000. The FDDI Concentrator Module costs $7,500, while the FDDI Enterprise Access Module costs $9,000. LANplex 5000 is expected to be available in the second quarter of 1991.

Synernetics also unveiled a low-end LANplex 2110, which offers the functionality of an Ethernet Express Card and an FDDI Enterprise Access Module in a single unit. It supports eight 10BaseT nodes or segments and two FDDI workstations, connecting both types of users to an FDDI backbone. LANplex 2110 costs $19,900 and is expected to be available in the third quarter of 1991.

Net management

Management of the LANplex hubs is supported through a Simple Network Management Protocol (SNMP) agent residing on the system processor card. For communications with that agent, Synernetics unveiled Viewplex, SNMP software that runs on a Unix workstation.

Another software component on the system processor card can translate Station Management-compliant messages generated by the FDDI components of LANplex into SNMP format and report those to Viewplex. Station Management is the FDDI management protocol.

Viewplex, which is expected to be available in the second quarter of 1991, will cost $19,900. ◻

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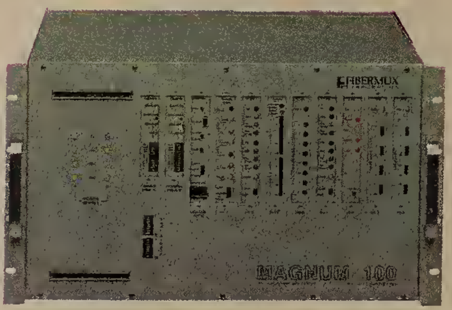

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MANAGEMENT STRATEGIES

MANAGING PEOPLE AND TECHNOLOGY: USERS GROUPS AND ASSOCIATIONS

Worth Noting

> "Top management doesn't view us as businesspeople but as technical people who are more loyal to technology than the organizations we work for."
>
> **Richard Kuehn**
> President
> RAK Associates
> Cleveland

Association Watch

The **National Centrex Users Group (NCUG)** will hold its 1990 conference in San Diego Nov. 6 through 9. Cosponsored by Pacific Bell and GTE Corp., the conference will feature seminars, exhibits and special program events. The meeting will bring together major central office equipment manufacturers on the exhibit floor and also highlight a variety of Integrated Services Digital Network products and services.

The cost of the conference is $50 for users, $100 for associate vendor members and $150 for non-NCUG vendors.

For more information, contact NCUG '90 Conference Director Norma Donofrio at (415) 328-5818.

Technovation Training, Inc., in alliance with **DISS, Inc.** and **Strategic Management Teams, Inc.**, will hold two-day workshops designed to increase the productivity of corporate, professional, government, educational or local user groups and associations.

"User Groups and Associations: The Management Imperative" focuses on leadership and management techniques for generating group participation, stimulating enthusiasm, promoting membership, and planning services and activities.

The next workshop is scheduled for Nov. 6 to 7 in St. Louis. For more information, call Technovation Training at (419) 537-1122.

MANAGEMENT PROFILE

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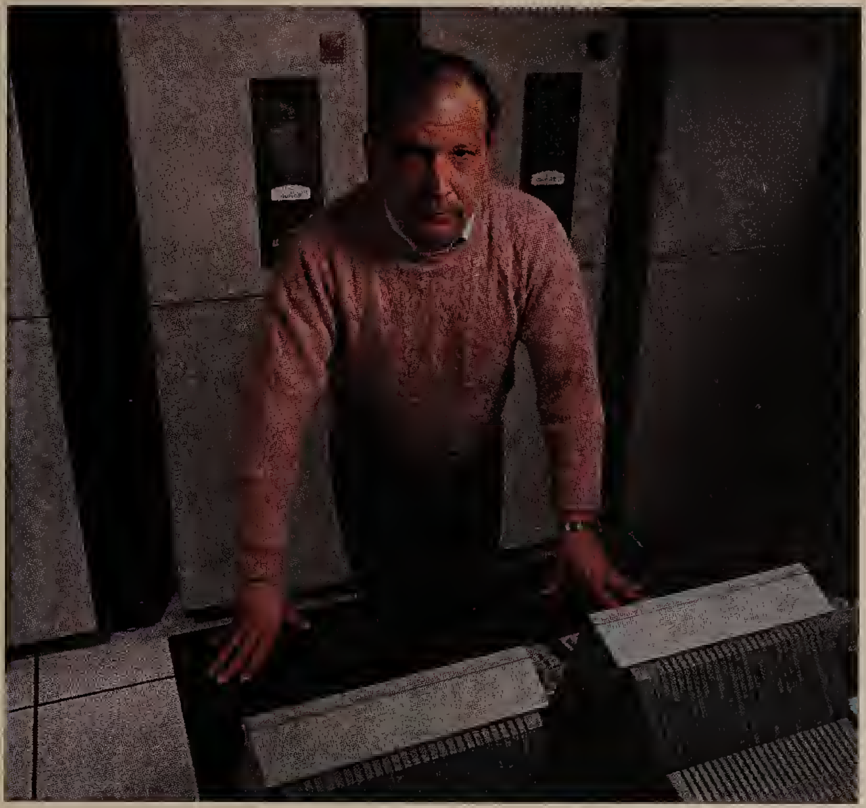


PHOTO ©1990 DAVE BRADLEY

Burlington Coat Factory's Michael Prince

Burlington saves with net application

By Maureen Molloy
Staff Writer

LEBANON, N.H. — Burlington Coat Factory Corp. is expanding the use of its very small aperture terminal network to support a price lookup application that is expected to provide the retailer with significant savings.

Michael Prince, data processing manager for the nationwide discount apparel chain, said the new VSAT-supported application, which is expected to be on-line next spring, will save money by speeding up purchasing transactions. It will enable clerks to serve more customers in less time and ensure more accurate pricing by eliminating manual price entry errors.

Merchandise in Burlington's stores will be priced using bar codes, and clerks will scan items at the point of sale. Computerized cash registers will have pricing data available for most items; that information will be downloaded daily to the systems from corporate headquarters here. For other items, the register's data request will be sent out to the host over the VSAT network.

"Our chain has a huge demand for price lookup since our stores stock hundreds of thousands of items, compared with specialty stores that may only stock tens of thousands," Prince said.

Prince said price lookup is only the latest cost-saving application the company has implemented since making the transition from dial-up lines to a satellite network four years ago. Burlington's Contel ASC-supplied DMN 2000 VSAT network gives all of its 157 stores two-way communications with the corporate data center.

According to Prince, the network enables individual stores and corporate headquarters to more efficiently and accurately track such things as inventory and credit authorization.

The satellite network also relays other critical information about store operations. Full transaction details — essentially, a condensed copy of register journals — is transmitted daily from each store to the mainframe at headquarters.

Every store is equipped with a DMN 2000 terminal and a Sun Microsystems, Inc. SPARCstation SLC that runs all applications for that store, including inventory control and electronic mail. It also supports electronic cash registers.

The VSAT net supports 1,200 bit/sec communications with Contel ASC's Mountain View, Calif., Network 2000 shared hub facility. Incoming credit authorization requests are routed via an X.25 switch from the hub to Visa-Net, the credit card authorization facility. All other traffic is sent to Burlington's data center via a 56K bit/sec leased line.

Prince said in addition to the cost-effectiveness of a speedier and more reliable net, the switch from dial-up lines to VSATs has resulted in other savings. Previously, access to the main-

(continued on page 28)

Top execs slow to see nets as strategic

Net managers say upper management still views nets as a cost center, not a competitive weapon.

By Maureen Molloy
Staff Writer

Despite the well-publicized successes of some innovative network users, top management at most companies is only slowly coming to understand the strategic business importance of the technology.

Network executives interviewed by *Network World* say many senior executives still view networking as a back-room operation and remain preoccupied with cost rather than competitive advantage.

"Management definitely sees the network department as a cost center and largely as a cost center that can be reduced," said Lionel Gillerman, manager of network technology at McDonnell Douglas Aerospace Information Services Co. "They tend to see the network more as a luxury and not as a key requirement."

Trudy Ririe, network manager for Los Angeles County, agreed. "Management is always looking at the bottom line, and we're considered a big cost to them."

"Network technology is here to stay, so senior management is bound to come around eventually," said Terry Norman, director of corporate telecommunications at Anacomp, Inc. "But right now, there are only a few enlightened CEOs out there who realize there's a quick way and a dead way to do business."

Norman said part of the blame rests with network executives, mainly because they don't know how to sell the importance of their services to their own company. Another problem, he added, is that many network managers are not sufficiently politicized within the organization.

"[Information systems] has to get out and meet those people outside the department and show them all the neat things they're doing that have business applica-

(continued on page 28)

BOOK REVIEW

BY ERIC SCHMALL

Disaster recovery handbook a valuable tool

Disaster Recovery Planning for Telecommunications, Leo Wrobel (Boston: Artech House, 1990), $48.

Leo Wrobel's new book on disaster recovery performs two valuable services for the reader: It offers a series of approaches that network managers can use to minimize their company's risks when disaster strikes and explains where corporate networks are most vulnerable to outages or disasters.

The book is ideal for someone delving into disaster recovery for the first time. Wrobel assumes no deep technical knowledge on the reader's part.

But the experienced manager will also benefit from the book. Wrobel explores a variety of disaster recovery options and planning methods, including the use of spare T-1 circuits, passive network hubs and special switching arrangements with carriers at their offices. He also describes how satellite and cellular technologies can be used in disaster recovery plans.

The book suggests ways that network managers can assess the vulnerability of their carriers' network to outages and potential disasters. These include discovering the configuration of carrier switching offices, the degree of diverse routing in carrier networks and carriers' own disaster recovery plans.

The book also discusses the liability of public and private companies that fail to establish disaster recovery programs. According to many attorneys interviewed by Wrobel, companies can be sued for negligence if they refuse to protect their information systems and networks from disasters.

The book will prove valuable to experienced disaster recovery managers who want to ensure that they have considered every option in their disaster planning.

CMA study says cost control is major concern

By Wayne Eckerson
Senior Editor

NEW YORK — Members of the Communications Managers Association (CMA) say one of their biggest concerns is controlling network costs, according to a membership survey presented at CMA's annual conference, which started here yesterday.

As a result, many CMA members are looking more carefully to find vendors that can provide quality products at the lowest price. In addition, a significant number of CMA members are turning to outsourcing as a means of reducing costs.

That concern may be one of the factors fueling CMA member interest in outsourcing. One out of every five CMA member companies is using an outsourcing vendor to handle all or part of its network operations, according to the survey, which was conducted for CMA by *Network World*.

The survey, based on responses from 189 CMA members, also explores the impact of key technologies such as voice processing and Integrated Services Digital Network on user networks, as well as such issues as downsizing.

CMA, which is holding its annual conference and exhibition this week at the New York Hilton, comprises more than 220 member companies headquartered in and around the New York metropolitan area.

The survey shows that CMA members are under increasing pressure to control communications expenditures.

"Most companies are coping with the pressure to cut costs by shopping around to find the best deals and keeping a close watch on expenditures," said Charles Murray, director of telecommunications at The Travelers Corp. in Hartford, Conn., and first vice-president of CMA.

Murray said that despite cost-control pressures, companies will continue to make investments in technology to gain or maintain a strategic advantage.

"Leading companies that have differentiated themselves through customer service and end-user support won't pull the plug on those programs by cutting technology expenditures," Murray said. "But [upper management] expects you to provide those services more cost-efficiently."

Today, CMA members said they believe networking is giving them a competitive edge. According to the survey, 81% of the members questioned believe communications technology is giving their companies a strategic advantage.

While network managers are looking to hold costs down today, they are also looking to several key technologies to provide a strategic advantage in the future.

One of those technologies is ISDN. Almost half (48%) of those surveyed said ISDN will have the most impact on their organization in the next five years.

About a third of those surveyed (32%) plan to use ISDN in their company's call center, the survey found. Others plan to use ISDN as a way to capture the telephone numbers of incoming callers, a feature known as automatic number identification.

But some CMA members expressed surprise that ISDN was on top of the list. Other technologies that were cited include voice processing, local-area networks, imaging, video and fast packet switching.

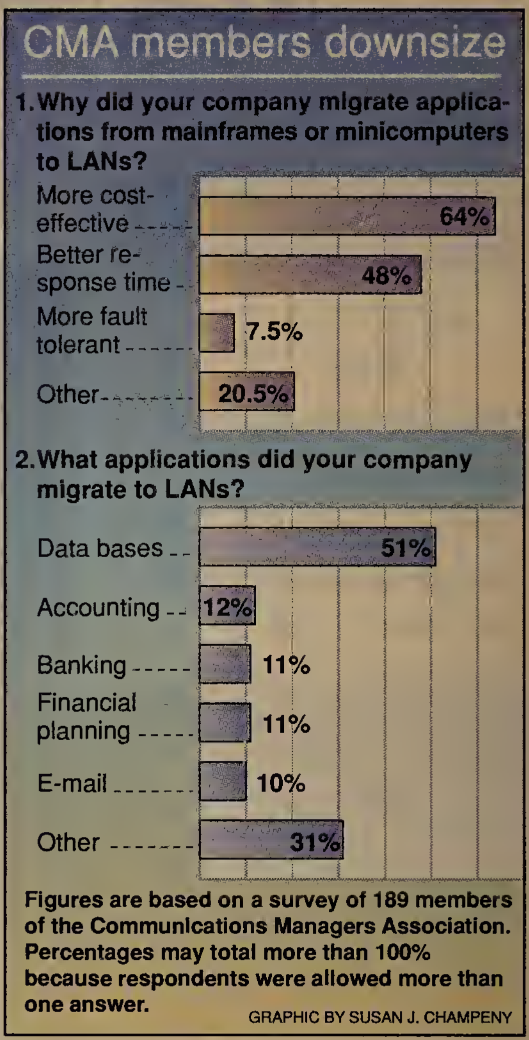
A majority of CMA member companies have already chosen to downsize applications to personal computer LANs. Three-quarters of those surveyed said their companies have migrated applications from mainframes and minicomputers to LANs.

CMA member profile

According to the survey, the typical CMA member is a communications manager who works in a financial service firm or bank that has a network budget exceeding $10 million.

This person supervises more than 10 employees, has at least a bachelor's degree and helps manage a network that has switching nodes primarily in the U.S.

While the largest percentage (26%) of CMA members are from the financial industry, other areas are well-represented. They include: manufacturing (16%), service (12%), insurance (11%), publishing (8%) and retail (7%). ◘



Figures are based on a survey of 189 members of the Communications Managers Association. Percentages may total more than 100% because respondents were allowed more than one answer.

GRAPHIC BY SUSAN J. CHAMPENY

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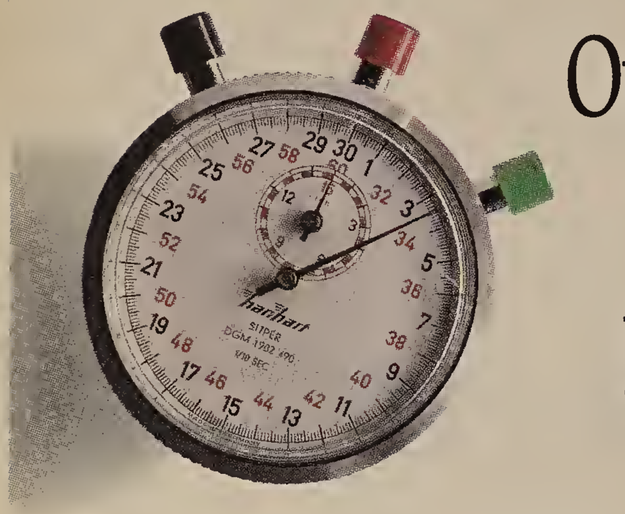

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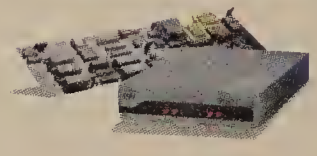

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☐ Departmental

Purchase Influence/Number of Sites
☐ One Site
☐ 2-9 Sites
☐ 10-20 Sites
☐ 21+ Sites

Product Advertised: ______________________

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Top execs slow to see nets as strategic

continued from page 25

tions — neither of which many IS people are inclined to do,'' said Norman. ''The successful network manager knows how to advertise his department's strengths, and knows how to play golf with the big boys.''

A net manager for a large government agency who requested anonymity agreed. ''In some cases, I've found that if management is wary, it's because IS hasn't adequately justified its cost,'' he said. ''If you're asking the company to spend big money on a network, you'd better be able to show them that it's a worthy investment.''

Network executives acknowledge that a small, but growing, minority of top managers have embraced the idea that technology can provide a competitive edge.

Jeff Marshall, managing director at Bear, Stearns Companies, Inc., said the top brass at his company knows the strategic advantages of networking because they use communications intensely.

Time is money

''Immediacy, cost and performance is directly related to our bottom line, and the network plays a crucial role in fulfilling those goals,'' Marshall said. ''We continue to invest in new technologies because they save us time and money.''

Some net managers say there is growing awareness among executives that business is increasingly being driven by technological change. Others added that top management is also realizing that success today often hinges on the ability to share information quickly and easily.

''Many executives look at networking as a necessary expense, but forward-thinking executives view it as a competitive tool,'' said Michael Toto, vice-president of corporate telecommunications at Johnson & Higgins in New Jersey. ''Networking will one day be a necessary business requirement, especially as companies become more globalized.''

Cheryl Currid, director of applied information technology at Coca-Cola Co. Foods Division in Houston, said the companies that understand the strategic advantage of information technology are those that are moving their organizations away from a hierarchical structure. ''Companies want to network all the people in the organization but, at the same time, eliminate several layers of management,'' said Currid. ''The only way that can be a survivable system is if they can pass information throughout the organization electronically.''

McDonnell Douglas' Gillerman is confident executives will eventually recognize that networking can help their companies do business better.

''As more executives ask for car phones, pocket phones and other exotic equipment and features, then they'll become more cognizant of technology's contribution to their bottom lines,'' he said.

Coca Cola's Currid agreed, adding that executives who don't adopt a more enlightened approach toward technology will suffer.

''It's my feeling that, ultimately, the market will take over and those companies that don't keep up with technological advances will fall behind because technology is one trend that isn't going to fade.'' she said.

Just do it

A number of network managers said that one of the best ways to get senior executives to recognize the business impact of network technology is to demonstrate it.

''Part of the problem for senior managers — and end users for that matter — is that there's a poor understanding of what's possible in the way of communications services,'' said Greg Scott, computing services manager at Oregon State University's College of Business in Corvallis. ''We have to communicate our ideas via demonstrations so they understand what we're trying to get across. Otherwise, there's no common frame of reference and management just hears a bunch of words they can't relate to.''

Mark Vanderford, systems engineer at Hewlett-Packard Co., agreed.

''I've seen cases where top management has denied certain new technologies but later changed their mind after lower level managers found ways to get pilots going and came back later with glowing results,'' said Vanderford. ''I may say a LAN is cost-effective, but I've got to prove it. You can't expect a savvy business head to have blind faith.'' ◼

Burlington saves with net application

continued from page 25

frame, primarily through public packet networks, cost from $400 to $1,200 monthly per store. DMN 2000 service costs $295 per month per site.

Prince said the network's single link to VisaNet has also brought the company additional savings by reducing average charge approval time from as long as 50 seconds on the previous dial-up system to less than 10 seconds. It also enables Burlington to minimize losses by authorizing every credit purchase, reduces its servicing fees by bypassing bank authorization systems and provides the company with a better discount rate for authorizations due to the increase in volume.

These features are important since roughly one-third — or $200 million — of Burlington's annual transactions are credit card-related.

''Even though we're always on the lookout for cheaper network alternatives, this system is still the most cost-effective we've found,'' said Prince. ◼

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INTERNATIONAL NETWORKS

USER STRATEGIES, INTERNATIONAL SERVICES & REGULATION

Worth Noting

On Jan. 1, all existing seven-digit telephone numbers in Tokyo's 03 area code will be changed to eight-digit numbers by adding a 3 in front of the first digit. For example, the number 123-4567 will be changed to 3123-4567. The 81 country code for Japan and 03 city code for Tokyo will remain the same.

World News

AT&T last week said it won a $157 million contract to install Hawaii-5 (Haw-5), a submarine fiber-optic cable running from the U.S. mainland to Hawaii that is scheduled to be cut over in 1993.

Haw-5, which is jointly owned by 23 carriers, will sport transmission speeds of 560M bit/sec per fiber pair. It will be the second fiber-optic cable running from the U.S. mainland to Hawaii, following Haw-4, which was cut over in 1989 and has a transmission speed of 280M bit/sec per fiber pair.

Haw-4 and Haw-5 each have two active and one backup fiber pairs. Haw-5 will connect with the Pacific Rim East (PacrimE) submarine fiber cable, which will run from Hawaii to New Zealand and is slated to be cut over in 1993. PacrimE, in turn, will link to Tasman-2, a submarine fiber cable that will run from New Zealand to Australia. These connections create the first fiber-optic route between the U.S. and Australia.

3Com Corp. recently said it will supply Canada's federal tax collection agency, Revenue Canada, with the country's largest 3+Open LAN Manager installation ever. About 3,000 personal computers will be networked. ◾

Carriers cut voice service fees between U.S. and U.K.

Could lead to reduced tariffs for int'l services.

By Jim Brown
Senior Editor

BASKING RIDGE, N.J. — AT&T recently said it has reached a revenue sharing accord with British Telecommunications PLC and Mercury Communications, Ltd. that could result in lower prices for voice service between the U.S. and the U.K.

Under the plan, the three agreed to cut by half the fee one carrier pays another to complete an international voice call. The reduction in the accounting rate would be phased in over the next three years.

This change could be a boon for users since a drop in the accounting rate often paves the way for reduced tariffs for such international services as direct dial, Megacom and WATS.

Domino effect

"This is likely to lead to about a 30% reduction in public tariffs," said Gregory Staple, an independent communications lawyer in Washington, D.C. "It is also likely to have a strong effect on rates between the U.S. and other major European markets."

Staple said carriers in other countries will be pressured to lower accounting rates in separate contracts with AT&T. If they don't, AT&T could route European traffic through a U.K. carrier, which AT&T would reimburse for the accounting rate paid to pass traffic off to other European countries. Accounting rates for calls between the U.K. and European countries are often lower than the rates for calls routed from the U.S. to Europe.

AT&T, British Telecom and Mercury agreed to drop the accounting rate used for calls between the U.S. and the U.K. from an average of $1.06 a minute to about 52 cents a minute.

If approved by the Federal Communications Commission and the Office of Telecommunications, the FCC's equivalent in the U.K., the first reduction in the accounting rate with Mercury would occur Jan. 1, 1991. British Telecom would lower its accounting rate for the first time on April 1, 1991. The accounting rate is expected to be reduced in three equal installments by 1993.

The accounting rate reflects the cost of providing an entire cir-

(continued on page 31)

British Telecom beats out Mercury in user survey

By Barton Crockett
Senior Editor

ORPINGTON, England — In a recent survey, U.K. users said British Telecommunications PLC is better at meeting delivery commitments for service orders than Mercury Communications, Ltd., British Telecom's principal competitor.

Of the 300 British Telecom subscribers surveyed, nearly two-thirds said the carrier delivers services on time most of the time. In contrast, less than half (43%) of the 216 Mercury subscribers surveyed said the same about their carrier.

Also, more survey respondents said they were fairly satisfied with the product delivery times quoted by British Telecom than with the delivery times quoted by Mercury.

The users surveyed are members of the Telecommunications Managers Association, a U.K. user group based here. Adrian Squires, public telephone operator liaison director with the user group and assistant controller for information technology at The Rank Organisation PLC in London, criticized Mercury for its standing in the survey.

"We would have expected that Mercury would have gotten better ratings; they're the new boys on the block," Squires said. "But in all the significant areas, Mercury was rated second best."

Mercury gained permission to compete fully with British Telecom in the U.K. long-distance market in 1984. Currently, the carrier is the only full-service competitor to British Telecom, although that could change once the U.K. completes a review of its existing duopoly structure, which is scheduled to begin next month.

Squires said disappointing performance by Mercury is one of the principal reasons so many U.K. users favor increased competition.

In the survey, more than half of the respondents said they would like to see three or four full-service long-distance carriers vying for business in the U.K. ◾

Toll-free goes global

International toll-free services from leading U.S. carriers

Carrier	Date service began	Number of countries supported	Charge for monthly service from the U.K.
AT&T	Jan. 1984	53	$1.20/min for first 10 hours $1.10/min from 10.1 to 35 hours $1.00/min for more than 35 hours
MCI Communications Corp.	June 1987	20	$1.07/min*
US Sprint Communications Co.	May 1990	6	$1.15/min*

* MCI and US Sprint offer discounts of 5% for monthly international toll-free billings of $1,000 to $3,000 and 10% for monthly billings of more than $3,000. US Sprint also offers discounts of 15% on monthly billings greater than $5,000.

GRAPHIC BY SUSAN J. CHAMPENY

Worldwide toll-free services in demand

Carriers answer international businesses' call for expanded toll-free service areas, numbering plan.

By Barton Crockett
Senior Editor

As demand for international toll-free calling services increases, carriers are improving their offerings by expanding service to more countries and working to implement unified global numbering plans.

While international toll-free services were rarely used until recently, demand is increasing as more users discover their value in doing business abroad.

As a result, more carriers are rolling out international toll-free services, including US Sprint Communications Co., which began working with foreign carriers in May to enable callers in the U.K. and France to place toll-free calls to the U.S.

US Sprint now supports international toll-free calling from six countries. MCI Communications Corp. supports the service from 20 countries, and AT&T, which pioneered the market in 1984, is about to make Hungary its 54th international toll-free service country (see graphic).

Carrier officials say international services represent a small but quickly growing portion of the approximately $6 billion in annual revenues U.S. carriers derive from toll-free services.

Last month, a group of carriers formed a committee to explore the feasibility of developing a single worldwide numbering plan for toll-free calling services.

Such a unified numbering plan would replace the disparate toll-free prefixes now used around the world. For example, the 1-800, 0850 and 0590 toll-free prefixes used in the U.S., U.K. and France, respectively, could be replaced with a single prefix.

This would enable users to employ a single toll-free number worldwide. For example, American Express Co. could have one number that customers anywhere in the world would use to report lost or stolen cards.

"It would open up new lines of revenue that don't exist today," said Bob Hoss, vice-president of telecommunications planning and engineering at American Express Travel Related Services Company, Inc. in Phoenix.

A committee examining the concept of a unified numbering plan was formed at the International Toll-Free Forum last month in Canada. Among those represented on the committee are AT&T, the Dutch carrier PTT Telecom and about 10 other carriers from various countries.

A unified numbering plan would replace the disparate toll-free prefixes now used.

▲▲▲

Larry Wazeter, product manager for AT&T international 800 services, cautioned that the committee has not yet established a formal agenda but expressed confidence in the group's success.

"At this point, it could work," Wazeter said. He added, however, that it would take years to deploy a unified toll-free numbering

(continued on page 31)

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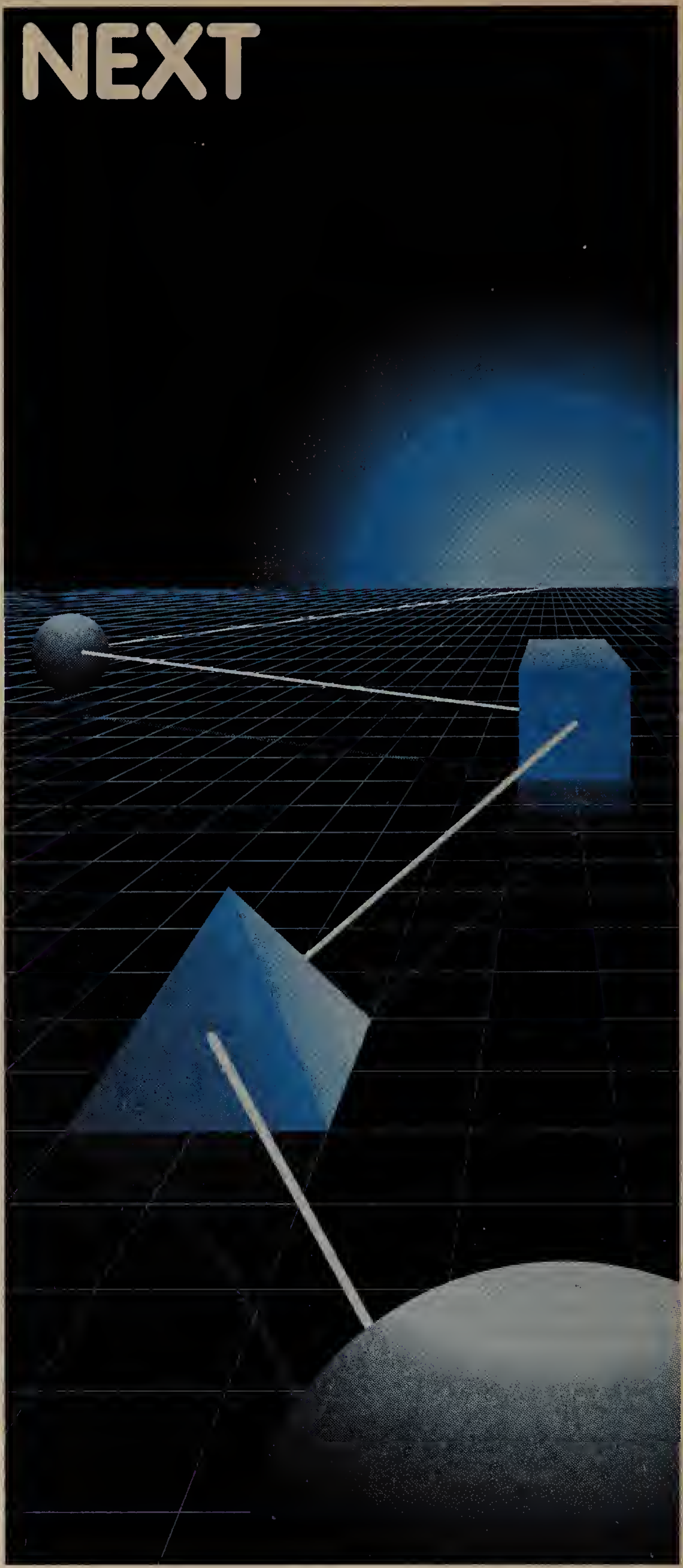

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Carriers cut voice service fees

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cuit between the two countries. The carrier originating the call must cover the expense of providing its side of the circuit and pay 50% of the accounting rate to the carrier that terminates the call.

Once other countries agree to lower their accounting rates, "I think we're talking about tariffs of between 45 and 50 cents a minute to Europe," which is down from the current 60 to 70 cents a minute, Staple said.

But others warned that lower accounting rates do not mean automatic tariff reductions because carriers must choose to pass savings along to users. AT&T declined to say if it planned to lower rates in response to its agreement with British Telecom and Mercury.

However, there has been a strong correlation between lower tariffs and accounting rate reductions. For example, AT&T lowered its international rates for calls to Canada from 20 cents a minute to 18 cents a minute after reaching an agreement with Telecom Canada to reduce the accounting rate.

Even if tariffs to the U.K. are slashed, it will most likely benefit consumers and small businesses that use such AT&T services as USADirect Service, Reach Out World, International Megacom and International ProWATS.

Whether users of volume discount plans — such as AT&T's World Connect or Global Software-Defined Network — will benefit is unclear. Customers of those services are already billed at off-tariff rates.

"It's not clear what the impact will be for major customers," Staple said. "This happened very suddenly, and [AT&T's] people have to work through how this might translate into a new [volume discount] package they can market." ◘

Global toll-free in demand

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scheme and numerous technical, regulatory and political hurdles must be overcome.

In the meantime, Wazeter said AT&T is encouraging foreign carriers to use 800 prefixes when rolling out toll-free services or when supporting AT&T's international toll-free service.

Donna Brooten, AT&T's product marketing manager for international 800 services, said that about half the countries supporting AT&T's international toll-free service incorporate the 800 prefix into the local access number.

Despite advances, carriers are struggling with a lack of consumer understanding because toll-free services are new in many countries.

"They just don't understand in many places that it's even possible to make an international call and not pay for it," Brooten said.

She added that even though AT&T has offered toll-free services in the U.S. for about 20 years, toll-free calling did not debut abroad until Canadian carriers began offering it in 1984, followed by carriers in the U.K. and Denmark in 1985.

Despite this deployment gap, an increasing number of multinational companies are relying on international toll-free calling services to support critical operations abroad. Among them is Canadian Pacific Forest Products in Vancouver.

Starting in 1988, Canadian Pacific stopped using independent agents to sell its products internationally and began supporting customers directly by offering toll-free calling from four countries in Europe and the Pacific Rim. Using toll-free numbers, customers can order products from Canadian Pacific service representatives in Vancouver.

David Paynter, Canadian Pacific's manager of marketing services, said the move slashed operating expenses and improved service by letting customers deal directly with the company rather than a third party.

But Paynter cautioned that there have been problems. For example, the company recently advertised a toll-free number throughout West Germany and later found that the service was only accessible in part of the country. ◘

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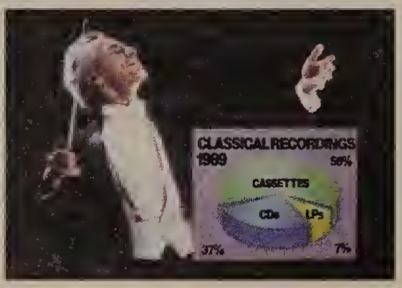

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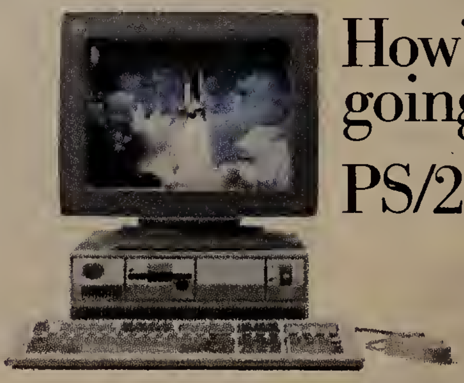

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PRODUCTS & SERVICES

THE LATEST OFFERINGS FROM VENDORS AND CARRIERS

First Look

Optimem unveils WORM optical drives for NFS

Optimem last week introduced two 12-in. and one 5¼ in. write once, read many (WORM) optical drives for use by hosts on local-area networks running Sun Microsystems, Inc.'s Network File System (NFS).

Optimem's **4400/Network Optical Server (NOS)** provides up to 4G bytes of permanent storage on 1-in. WORM optical disks, while the **Optimem 600/NOS** provides 654M bytes of storage on a 5¼ in. optical disk.

Each optical drive cabinet houses a proprietary NOS developed by Symmetrical Technologies of Knoxville, Tenn. The NOS is a single-board computer that acts as a network server and enables networked devices to request files from the optical server.

The Optimem 4400/NOS costs $22,800; the Optimem 600/NOS costs $8,795. Shipments of each are scheduled to begin in December.

Optimem, 297 N. Bernardo Ave., Mountain View, Calif. 94043; (415) 961-1800.

Cone Software releases SQL data base query tool

Cone Software recently announced **Kicks/SQL Version 2.0,** a data base query tool that enables SQL users to directly access IBM DB2 data bases from CICS environments.

The software, which runs on IBM MVS mainframes, enables users to send SQL requests to DB2 from IBM's CICS and immediately view the results. Previously, Kicks/SQL users had to sign off CICS and log on to a DB2 data base via IBM's TSO software or other facility.

Company President David Hastings said the product could be used, for instance, to develop a transparent link between an SQL front-end data base program running on a workstation or local-area network server and a host-resident DB2 data base. Users could access DB2 data as if it were stored locally.

Kicks/SQL is available now and costs $8,000, regardless of which processor the soft-

(continued on page 38)

Arche Technologies to add mainframe-class server

Arche MP will support symmetric multiprocessing.

FREMONT, Calif. — Arche Technologies, Inc. plans to announce next month a high-performance local-area network server that offers mainframe-class processing and is capable of operating at a maximum of 320 million instructions per second.

The company is also expected to roll out a low-cost model for its Legacy line of workstations.

The Arche MP, which will make its debut next month at Comdex/Fall '90 in Las Vegas, combines a mainframe architecture with symmetric multiprocessing to support as many as 32 Intel Corp. 80386- or 80486-based processor boards.

The product will be positioned as a compute-intensive server capable of handling number-crunching design or modeling tasks without degrading server performance of other attached workstation users.

An 18-slot server housed in a tower enclosure, the Arche MP supports two internal buses. One is an Extended Industry Standard Architecture (EISA) bus that handles traffic between the system memory and disk controllers, LAN adapter cards and other peripherals. The other is the Advanced Split Transaction Arche MP bus, a scheme that links any of the system's 32 processor cards at 128 bit/sec.

Each Arche MP processor board comes with a memory cache ranging from 128K bytes to 1.024M bytes. The Arche MP also supports a proprietary bus snooping scheme, in which the server polices the proprietary bus, keeping it free of traffic from peripheral devices and giving the system's multiple processor boards the right of way.

The server can run DOS, Unix and OS/2. It also supports Novell, Inc.'s NetWare and Microsoft Corp.'s OS/2 LAN Manager network operating systems.

"This system will significantly increase the PC's ability to process concurrent applications in multiuser environments and network operating systems," said Joseph Kua, vice-president of research and development as well as acting president.

The company said it will eventually support other processors — such as Sun Microsystems, Inc.'s scalable processor architecture (SPARC), a Reduced Instruction Set Computer micro-

(continued on page 34)

NPI intros FDDI interfaces for AT-, EISA-based micros

SAN JOSE, Calif. — Network Peripherals, Inc. recently announced two FDDI interfaces for personal computers, one for microcomputers based on the AT bus and the other for machines using the Extended Industry Standard Architecture (EISA) bus.

The boards, which come with support for a variety of network operating system environments, are based on a highly integrated second-generation design that made it possible to issue both products as single cards.

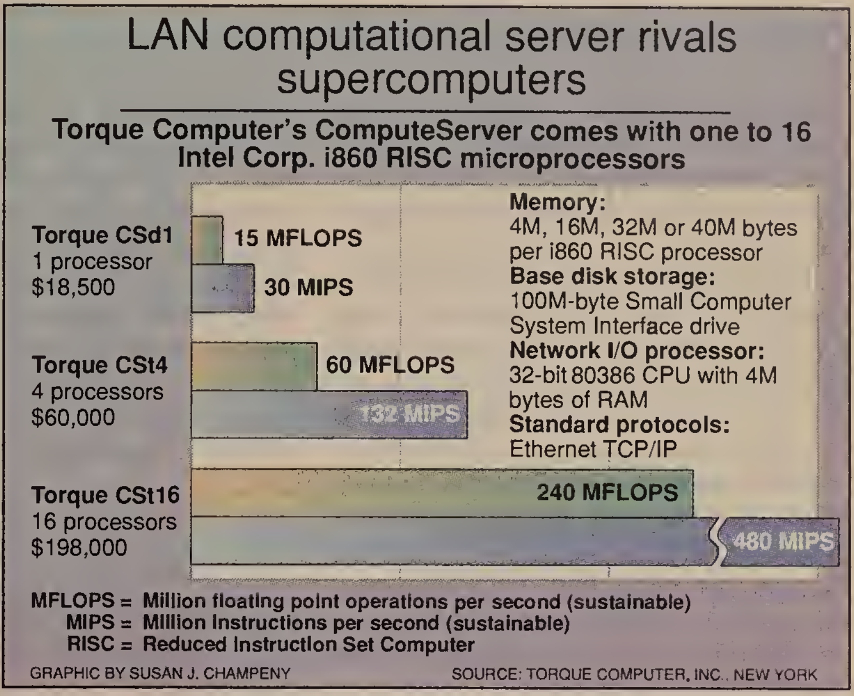
The NP-EISA Fiber Distributed Data Interface for EISA-based workstations enables microcomputers to take data off the fiber network at 100M bit/sec, queue it and send it across a 32-bit EISA bus at 33M byte/sec using the burst transfer mode.

The EISA interface has software drivers for Novell, Inc. NetWare 386 and NetWare 2.1X, Microsoft Corp. LAN Manager 2.0 and Sun Microsystems, Inc. PC-NFS. The NP-AT interface for personal computers based on the AT bus can also take data off the network at 100M bit/sec, but the actual transfer speed is limited to 3M byte/sec because the AT bus is only 16-bit and does not support burst mode transfer, according to Tom Slykhouse, technical marketing manager for the company.

"In this case, the machine is actually starving the network," Slykhouse said. Nonetheless, some customers may need to link AT machines directly to FDDI backbones. For example, some users may utilize the EISA interface to link a server to the backbone and the AT interfaces to link end-user devices.

The boards can be used in single-attach station (SAS) or dual-attach station (DAS) FDDI configurations. In the former, a single card will support a fiber-pair (send-and-receive) connection to a network concentrator on the FDDI backbone. With DAS, two cards are used, one to provide a fiber-pair link to the nearest neighbor on one side of the

(continued on page 35)



GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: TORQUE COMPUTER, INC., NEW YORK

Torque unveils RISC server for Ethernets

ComputeServer can support up to 16 RISC chips to offer supercomputing power to workstations.

NEW YORK — Torque Computer, Inc. last week announced a scalable, Reduced Instruction Set Computer-based local-area network server that can be configured with as many as 16 Intel Corp. i860 microprocessors providing performance ranging from 30 million instructions per second (MIPS) to 480 MIPS.

The ComputeServer, which supports a client/server software environment, is intended to make supercomputer processing power available to desktop machines on Ethernet LANs.

Applications must be recompiled using Torque tools to break them down into client and server components. The client software runs on desktop machines and includes the standard user interface, while the server portion can be executed in parallel over multiple processors in the ComputeServer.

The goal is to make it possible to off-load compute-intensive tasks of applications, such as 3D graphics and scientific and financial simulations, to the server and leave the interactive tasks to the end-user device.

The goal is to make it possible to off-load compute-intensive tasks to the server.

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The company is offering two versions of the server. The first is a desktop device that can be configured with one or two processors and has an entry-level price of $18,500. The second is a floor-standing machine that can be configured with one, two, four, eight, 12 or 16 CPUs and has an entry-level price of $25,500. The server is designed to be field upgradable, and each processor upgrade and additional 4M bytes of memory costs $11,500.

The entry-level ComputeServer d1 is capable of processing 66 MFLOPS.

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The entry-level ComputeServer d1, which comes with one i860, is capable of processing 66 million floating point operations per second (MFLOPS) in peak periods and 15 MFLOPS on a sustained basis. By comparison, the top-of-the-line CSt16 can achieve 1,015 MFLOPS during peak times and 240 MFLOPS on a continuous basis.

All of the systems come standard with an Ethernet interface and an I/O processor based on an Intel 33-MHz 80386 microprocessor. They also come standard with Unix V and Torque's OPAL system software.

OPAL, which coordinates the network and parallel processing tasks of the multiprocessor servers with the efforts of the desktop

(continued on page 35)

Tekelec intros statistical analysis system for monitoring FDDI nets

ChameLAN 100 lets users track net problems, performance.

SAN JOSE, Calif. — Tekelec, Inc. recently rolled out its ChameLAN 100, a statistical analysis test system for monitoring traffic on a Fiber Distributed Data Interface network.

Introduced at the INTEROP 90 Conference and Exhibition, the product is designed to enable users to diagnose network problems, test the performance of products and resolve interoperability issues in a network environment.

The ChameLAN 100 FDDI network analyzer consists of an Intel Corp. 80386-based IBM Personal Computer AT that runs Unix and comes standard with 8M bytes of memory and a 100M-byte hard drive.

> "All data may be captured," Hess said. "That's because we offer full bandwidth monitoring of frames, fragments, symbols and line states."
>
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Internally, the system houses a front-end Reduced Instruction Set Computer (RISC)-based, 32-bit Inmos Corp. T400 Transputer board that handles all processing of FDDI data. It contains an Advanced Micro Devices, Inc. FDDI SuperNet chipset. The RISC-based front end also comes standard with 5M bytes of buffer memory, upgradable to 20M bytes.

The ChameLAN 100's front end interfaces to the two FDDI rings and appears to the network as an FDDI repeater, which does not affect traffic on the network.

Bob Hess, director of corporate marketing, said ChameLAN 100 supports the 4B5B coding scheme used in FDDI networks, in which four data bits are coded into 5-bit lengths and transmitted at a line rate of 125M bit/sec. That means the analyzer can capture all possible data frames, even when network bandwidth is at full utilization. "All data may be captured," Hess said. "That's because we offer full bandwidth monitoring of frames, fragments, symbols and line states."

The ChameLAN 100 is capable of decoding Transmission Control Protocol/Internet Protocol and Open Systems Interconnection data. Hess said the company will add decoding support for other protocols as demand warrants.

Passing the data

Once data is processed on the Transputer card, it is passed on to the Personal Computer AT to be displayed in a variety of pop-up color windows, pull-down menus and on-line help screens. The Personal Computer AT supports the X Window System and Open Software Foundation's MOTIF user interface.

A network status window on the ChameLAN 100 shows the network activity in real time. The window contains a ring status display and network traffic statistics. Traffic activity can be shown in frames per second, tokens per second, frame error rates and bytes per second utilization.

The product also features trigger, filter and slice monitoring capabilities built into the machine's hardware that enable the device to capture specific network data based on user-defined events.

The ChameLAN 100 also comes with an intelligent statistics package, with bar and line graphics that depict network information that users can study to interpret FDDI protocols such as Media Access Control, as well as higher level protocols such as TCP/IP and OSI.

ChameLAN 100 costs $37,500 and is scheduled to ship in February.

For more information, contact Tekelec at 26580 W. Agoura Road, Calabasas, Calif. 91302, or call (800) 835-3532. ◪

Arche Technologies to add server

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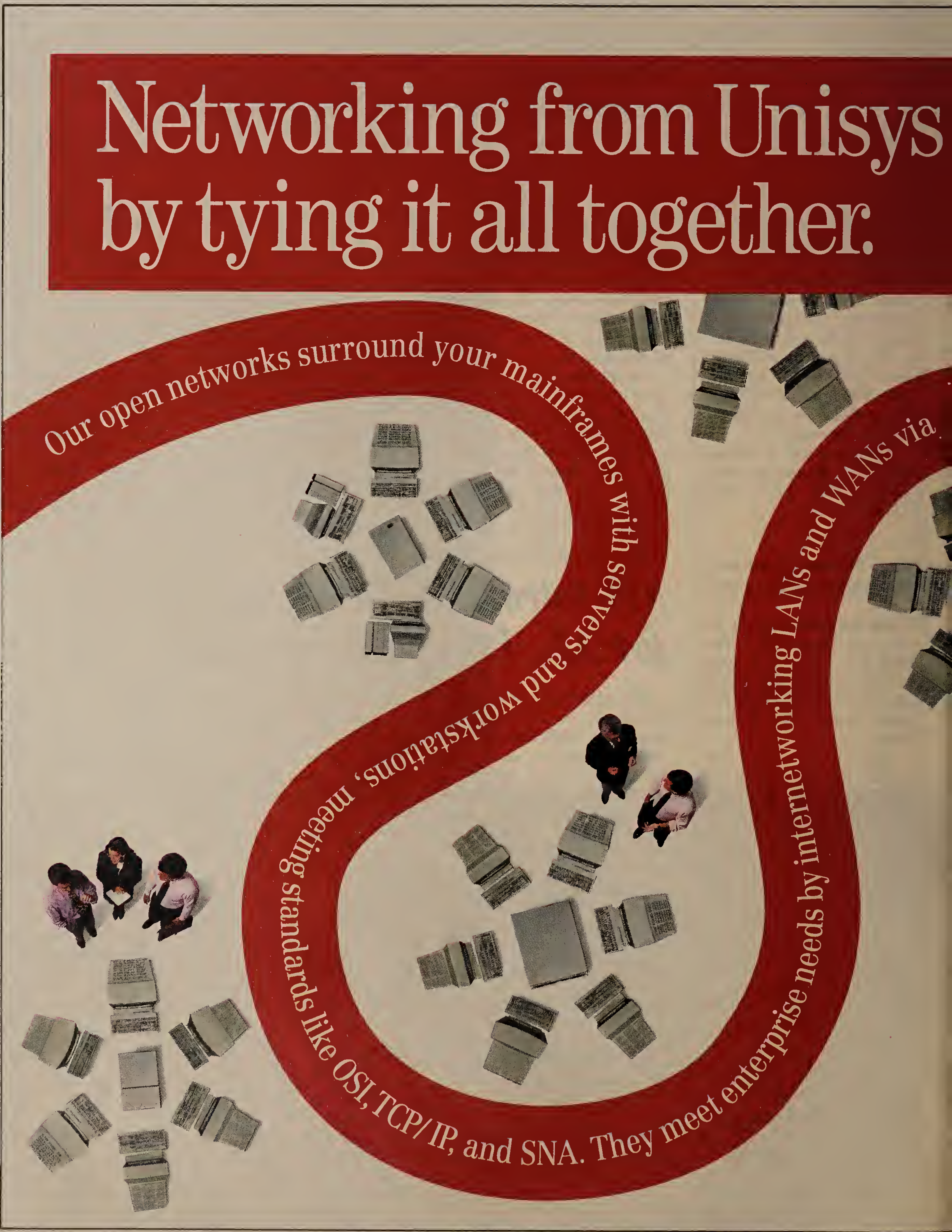
processor. A spokesman said the SPARC boards and 80386 and 80486 processors would reside in the same server.

The company also said it plans to announce its Legacy 386-25, a 25-MHz 80386-based IBM Personal Computer AT workstation that comes with 8M bytes of memory (expandable to 16M bytes), a 32K-byte memory cache and six 16/8-bit bus slots. The system also comes with software drivers for LAN Manager and NetWare.

The Legacy 386-25 is a low-end model that complements the firm's 80386 33-MHz Legacy model and higher performance 80486 Legacy workstations. It costs $3,295 and should ship next month.

Arche Technologies has not set pricing for the Arche MP; the product is expected to ship in the second quarter of 1991.

Arche Technologies is located at 48881 Kato Road, Fremont, Calif. 94539, or call (415) 623-8100. ◪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Torque unveils RISC server for Ethernets

continued from page 33

clients, supports an implementation of Linda, an emerging application program interface standard for parallel processing.

OPAL capitalizes on modular programs by using Linda, a programming concept conceived by David Gelernter at Yale University, to supplement conventional languages such as C with a few statements that make it possible to divide functions into client and server components. Torque's implementation of Linda makes it possible to job out these functions to multiple processors.

Linda acts as a preprocessor for C source code and also allows FORTRAN code to be linked and executed in parallel, according to the company. Applications compiled for one OPAL-compatible machine can be executed at full speed on any other OPAL machine, regardless of the number of processors in each system.

Torque is offering compilers that make it possible to add Linda statements to existing code and development tools in order to create applications with Linda.

The compilers include ComputeServer Linda, which costs $950; ComputerServer ANSI C, which is priced at $1,500; and the ComputeServer Fortran 77, which costs $2,500.

The development tools for customers writing their own code include the $450 MPW Linda for Apple Computer, Inc. Macintosh-based applications and the $950 SunOS Linda for Sun Microsystems, Inc. SPARCstation-based applications. The company promised to deliver a development tool for personal computers in 1991.

All of the products should be available within 90 days of receipt of order.

One early user of the product said he was impressed with the machine's speed, the ability to upgrade the server, the ease of programming with MPW Linda and the technical support from Torque.

Wayne Joerding, associate professor of economics at Washington State University in Pullman, Wash., is using the floor-standing model configured with one i860 microprocessor as a ComputeServer for an Ethernet-attached Macintosh II.

Joerding is researching the use of neural-network technology in empirical economic analysis. Specifically, he's using neural-network mathematic models to model Seattle housing prices.

In his model, which he is programming using Linda C, Joerding is predicting the housing prices of 15,000 homes, comparing the result to the actual sales price, and taking the difference and squaring it in a process called sum-of-square computation. The information used in the process is automatically fed back into the neural network in an effort to improve the accuracy of the prediction.

The whole process — comparing the predictions to the actual prices, calculating the sum of square and refining the network — has to be run through three million times to gain sufficient accuracy, Joerding said.

Running a similar model on his Macintosh (16 MHz, 32 bit, .5 MFLOPS) with data for only 50 houses and 3.5 million sum-of-square computations took more than three days to complete. He said he anticipates that the single processor ComputeServer will be able to process data for 15,000 houses in four to five days.

> One early user said he was impressed with the machine's speed, the ability to upgrade the server, the ease of programming with MPW Linda and Torque's technical support.
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In another speed comparison, Joerding said the ComputeServer was 70 times faster than his Macintosh in compiling vector matrix multiplication algorithms written in C code.

Although he is only using one Macintosh with the ComputeServer now, Joerding said he would eventually like to add other microcomputers to the TCP/IP-based Ethernet link and let students use the server as well. He said he may also add additional processors to the server.

Joerding, an economist by vocation, said he was pleased with the technical support Torque has given him with the ComputeServer. "The company is good to deal with," he said. "The technical people have given me great support."

For more information, contact Torque at 81 Franklin St., New York, N.Y. 10013, or call (212) 925-1715. ▣

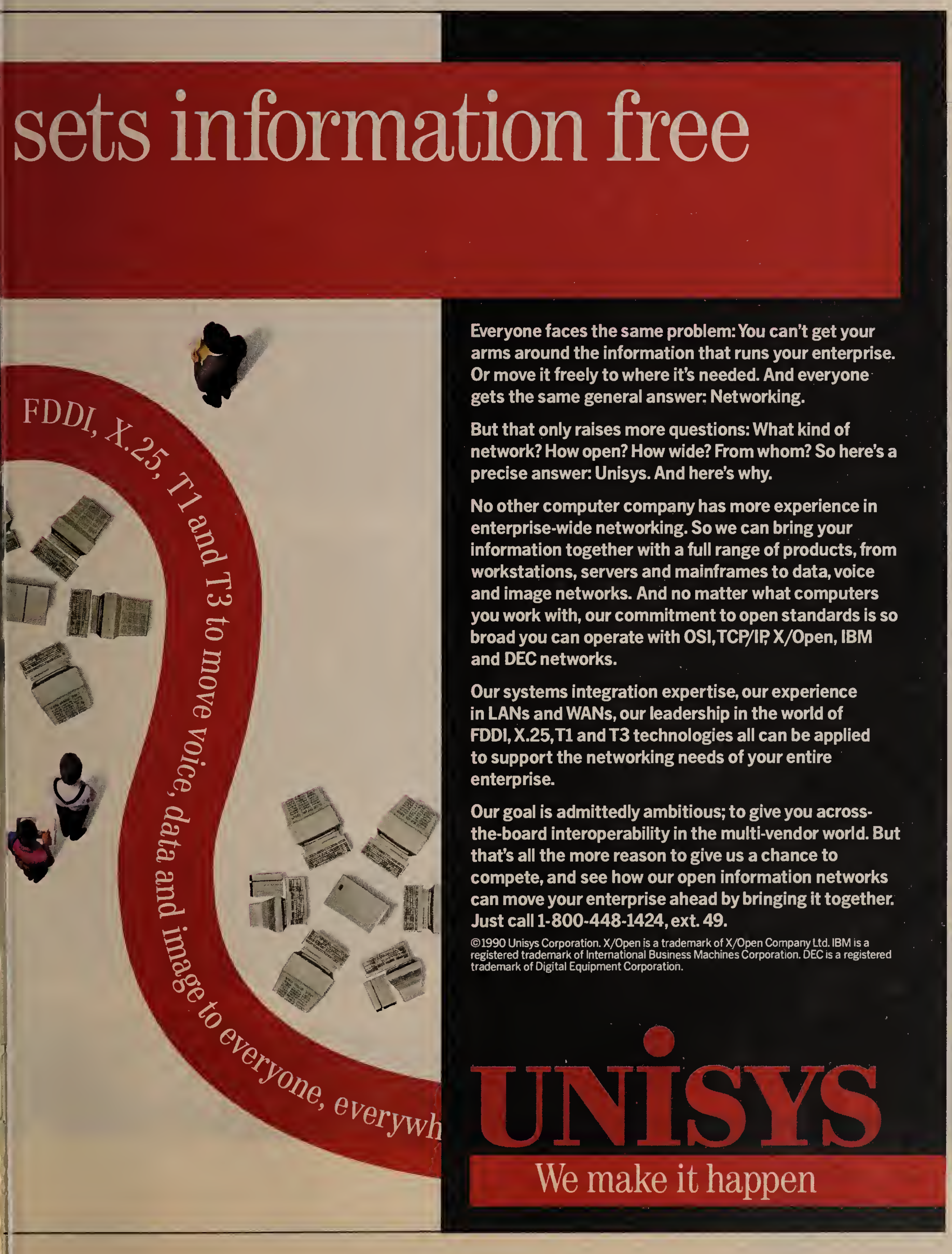
NPI intros interfaces for AT, EISA micros

continued from page 33

machine and the other to support a fiber-pair link to the nearest neighbor on the opposite side. Both interfaces support the station management functions of the FDDI standard. In fact, some of the functions, such as connection management, have been embedded in an on-board processor, Slykhouse said.

The AT interface card costs $3,495 and is available now. The EISA card costs $3,995 and will be available in December.

Network Peripherals can be reached by writing to 2890 Zanker Road, San Jose, Calif. 95134, or by calling (408) 954-8030. ▣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First Look

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ware will support.

Cone Software, 309 Chelsea Pkwy., Boothwyn, Pa. 19061; (215) 497-0300.

Asante Technologies announces Apple Mac Ethernet interfaces

Asante Technologies, Inc. last week rolled out a line of Ethernet interfaces for Apple Computer, Inc.'s new Macintosh IIsi and Macintosh Classic models.

The company announced its **MacCon+ 30i**, an Ethernet interface that plugs directly into the computer's Direct Slot 030 bus without requiring users to purchase a $200 extender card. MacCon+ 30i is available in two versions, one supporting thick Ethernet connections and the other supporting thin-wire links. Both cost $495 and are available now.

For the Macintosh Classic, Asante introduced its **EN/SC** external Small Computer System Interface (SCSI) attachment that connects a Macintosh to an Ethernet via an SCSI port. The device is offered with thick, thin and twisted-pair Ethernet connections and two SCSI ports. The EN/SC costs $595 and is expected to ship in December.

The two products support Apple's AppleShare, Sitka Corp.'s TOPS and 3Com Corp.'s 3+Open network operating systems. The company also said it would develop an Ethernet interface for Apple's forthcoming Macintosh LC in time for the computer's shipment next year.

Asante Technologies, Inc., 405 Tasman Drive, Sunnyvale, Calif. 94089; (408) 734-4844.

Harris & Paulson unveils LAN-based document management pack

Harris & Paulson, Inc. recently unveiled **reQuest,** document and file management software designed for use on local-area networks running Microsoft Corp.'s LAN Manager or Novell, Inc.'s NetWare.

The reQuest software is a client/server-based application based on Saros Corp.'s Mezzanine data base management system and Microsoft's SQL data base technology. Currently, the software is designed to run solely with WordPerfect Corp.'s WordPerfect and enables users to store, catalog and retrieve files across multiple servers. Users can also perform file version tracking.

The reQuest software, which is available now, costs $2,950 per server, plus $395 per user for client software.

Harris & Paulson, Inc., 5299 DTC Blvd., Englewood, Colo. 80111; (303) 773-8283.

Spider enhances SpiderMonitor 220 and SpiderAnalyzer 320

Spider Systems, Inc. recently announced improved performance and expanded features for its **SpiderMonitor 220** and **SpiderAnalyzer 320.**

The company said it upgraded the Intel Corp. 80186 microprocessor on its personal computer-based analyzer boards from 8 MHz to 16 MHz, thereby increasing the processing of 200-byte packets from 2,500 packet/sec to 5,500 packet/sec. The enhancement gives users more data with which to analyze packets by breaking them down by protocol type, packet length and Internet Protocol address.

The company also increased the number of workstations that could pass alarms to its SpiderMonitor 220 and SpiderAnalyzer 320. Unlike previous versions of the products that supported alarms from a maximum of 50 users on an Ethernet, the upgrades can support alarms from as many as 1,024 devices on a LAN.

The company also said the two products now can decode data supporting Banyan Systems, Inc.'s VINES software, Network Basic I/O System data running over Transmission Control Protocol/Internet Protocol nets, 3Com Corp.'s 3+Open and IBM's Server Message Block protocols. Previously, the products could decode TCP/IP, Digital Equipment Corp.'s DECnet, Xerox Corp.'s Xerox Network Systems, Apple Computer, Inc.'s AppleTalk and Novell, Inc.'s NetWare protocols.

The enhancements are scheduled to ship next month. SpiderMonitor 220 and SpiderAnalyzer 320 pricing remains unchanged at $8,600 to $15,600 for both products.

Spider Systems, Inc., 12 New England Executive Park, Burlington, Mass. 01803; (617) 270-3510.

Interlink SNS/NFS software lets MVS mainframes act as LAN file servers

Interlink Computer Sciences, Inc. recently announced **SNS/NFS,** a software package that enables IBM mainframes running MVS to operate as high-performance file servers for attached client workstations supporting Sun Microsystems, Inc.'s Network File System (NFS).

SNS/NFS is an addition to the company's Software Network Solution (SNS) line and must be used in tandem with Interlink's SNS/TCPaccess and SNS/API products.

SNS/NFS resides on an IBM MVS mainframe connected to an Ethernet network via an Interlink or third-party controller. It allows other computers supporting NFS to request files directly from the IBM host. Requests are passed on to SNS/NFS via SNS/TCPaccess, which provides base-level TCP/IP connectivity such as Telnet terminal emulation and support for file transfer protocols.

SNS/NFS is available now for $9,950.

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47370 Fremont Blvd., Fremont, Calif. 94538; (415) 657-9800.

Micom rolls out enhancements to XNMS X.25 management system

Micom Communications Corp. recently took the wraps off its **X.25 Network Management System (XNMS) Release 2.0,** adding several enhancements that will let network managers quickly revive a failed device or remedy a network crash.

Announced at the INTEROP 90 Conference and Exhibition, XNMS Release 2.0, which monitors and controls activity on Micom X.25 packet switches and packet assembler/disassemblers, provides users with several improved functions as well as a fully revamped pricing structure that will make the software more affordable to a greater range of users.

The company has added a $6,500 and $10,750 version of the network management system to its existing $50,000 package. All three versions offer the same functionality, but the less expensive packages support fewer X.25 switches and PADs than the full-blown version. The company also enhanced the software to support an unlimited number of users. Previously, the software supported only a single, centralized management station.

The company also enhanced an existing beeper service so that, in the event a device fails or network performance seriously degrades, the software will dial a secondary beeper number if a call to the primary number is not answered.

Micom Communications Corp., 4100 Los Angeles Ave., Simi Valley, Calif. 93063; (805) 583-8600.

Comdisco boosts BONeS software to emulate E-net, token ring and FDDI

Comdisco, Inc. recently announced an upgrade to its **Block Oriented Network Simulator (BONeS)** software that enables users to simulate Ethernet, token-ring and Fiber Data Distributed Interface networks.

The introductions of the BONeS 1.5 library adds system models of Ethernet, token-ring, FDDI, X.25 and communications routers to the main software. BONeS users can modify these networks by plugging in node objects also in the library.

Users can also model traffic generation characteristics of each network node, and simulation results are collected via probes placed within the network model by a user. The software enables users to estimate delay, throughput utilization and load characteristics of a LAN.

The library also contains a campus network model consisting of two campus networks connected via a long-haul router. One net consists of an FDDI ring connecting four Ethernets and two file servers. The other campus net comprises a 16M bit/sec token ring connecting two Ethernets and two file servers. Comdisco said simulation results of an Ethernet segment of the campus network were within 0.7% of actual measured data. BONeS 1.5 also now supports Sun Microsystems, Inc.'s Open Windows interface.

Comdisco, Inc., 6111 N. River Road, Rosemont, Ill. 60018; (312) 698-3000.

Netrix interface card enables #1-ISS to support E-1 speeds

Netrix Corp. recently unveiled an interface card for its #1-ISS Integrated Switching System that enables it to support 2.048M bit/sec European T-1 (E-1) lines.

The **2Mb** interface is compatible with many E-1 services, including British Telecommunications PLC's Megastream offering, Netrix said. The E-1 interface is available now for $3,500.

Netrix Corp., 13595 Dulles Technology Drive, Herndon, Va. 22071; (703) 742-6000.

MaCo Networks announces server, enhancements to LANFrame line

MaCo Networks, Inc., a network systems integrator, recently announced four additions to its LANFrame servers.

LANFrame486 is an enhanced version of MaCo's original LANFrame multifile server and is based on an Intel Corp. 80486 microprocessor and the Extended Industry Standard Architecture bus architecture. It comes standard with 8M bytes of memory (expandable to 24M bytes) and 600M bytes of hard disk storage. It costs $19,995.

LANFrame4 Server is an 80286-based computer on a card that fits into an LANFrame multifile server and enables users to off-load some tasks, such as gateway processing, electronic mail handling and tape backup, from the host memory to the add-on card. It costs $3,995.

LANFramePSP is a stand-alone device that segments an Ethernet to improve throughput on extremely large Ethernets. Unlike traditional bridges, the LANFramePSP packet-switched processor handles multiple broadcasts simultaneously. LANFramePSP costs $7,995 for a two-port configuration. Additional ports, up to a maximum of three, can be purchased for $1,495 each.

LANCall is an 80386-based interface that fits into a LANFrame and provides as many as 15 ports for dial-up connections from remote personal computers. The product must be used in tandem with Novell, Inc.'s Netware Access Server software. LANCall costs $5,995.

MaCo Networks, Inc., 802 E. Martintown Road, BTC 361, North Augusta, S.C. 29841; (803) 278-7225. ◻

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OPINIONS

OSI

BY ANDRES LLANA JR.

Open systems have arrived in the U.S. marketplace

Recently, a group of 21 vendors, comprising software developers and computer manufacturers, met at Unisys Corp.'s San Jose, Calif., facility to demonstrate that Open Systems Interconnection has arrived in the form of commercial products for the U.S. market.

The remarkable aspect of this test was that products from these 21 vendors, which had never before worked together, were able to interoperate within a week.

In this "hot stage trial," each participating vendor was required to set up and configure its system, then complete at least five File Transfer, Access and Management (FTAM) and three X.400 transmissions between its system and those of each of the other participants. Data General Corp., Digital Equipment Corp., IBM, Tandem Computers, Inc. and Unisys clearly demonstrated the ability of their operating systems to interface with one another by transmitting an FTAM file across interconnected local-area networks.

> The off-the-shelf OSI software products demonstrated prove beyond a doubt that OSI is here in a commercial form.
>
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Considering the rigid time constraints and the intensity of effort required, these tests prove that in a typical business environment, a network planner would have little difficulty establishing an interoperative networking arrangement, given the establishment of OSI utilities within corresponding networks.

Some of the vendors that participated in the trial indicated that they expect to have the OSI transaction processing protocol available in the near future.

Implementing this protocol will give network planners greater flexibility and will enable them to introduce new capabilities, such as worldwide call management service centers to support more global product distribution schemes. It will also support and enhance Integrated Services Digital Network, for example, as it becomes the worldwide standard for integrated information transmission.

The off-the-shelf OSI software products demonstrated in the San Jose tests prove beyond a doubt that OSI is here in a commercial form, which opens the door to multivendor networks and user independence.

Net planners can now mix and match equipment across a geographically dispersed network. Thus, dependence on one vendor as a source of supply for a complete global network can be eliminated in favor of a more diverse logistical support strategy.

Net planners can now address more strategic deployment of their networks, allowing for a broader number of vendors with OSI capabilities to be used to support their enterprise networks. This, in turn, gives rise to a more competitive marketplace and is especially attractive for the smaller, more specialized vendors, which can now compete on more equal footing with the larger firms.

Net planners should take the initiative and begin to implement OSI software in their networks.

The U.S. doesn't have to lose out to other, more aggressive world competitors. Before we find ourselves falling behind the net power curve, we should begin to get our networks in line with those of the rest of the world.

Llana is director of consulting services for Vermont Studies Group, Inc., a telecommunications consulting firm in West Dover.

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EDITORIAL

Dealing with the dilemma of cost-justification

Like network managers, the reporters and editors at *Network World* spend a good deal of time listening to end users — our readers — to understand their problems and needs.

One thing that has become abundantly clear is that network executives are facing increasing pressure to not only rein in costs but to do a better job of justifying major network expenditures.

Cost-justification is nothing new. For years, information systems (IS) managers have prepared cost-benefit analyses exploring how expenditures will improve productivity or cut costs.

Many managers have struggled to quantify "soft" benefits from new network and computing systems.

But justification is getting even more difficult. Senior management increasingly expects IS executives to show how investments will give their companies a competitive edge — how expenditures will win new market share or open new markets.

A primary reason for this shift is that top management in many companies has come to view networking and IS as more than back-room functions and as more than ways to automate routine operations, reduce head count or trim costs. Top management is pushing IS to devise methods for offering new services and products or to cement ties with customers and business partners through technology.

With scrutiny of IS spending on the rise, the real business impact of technology investments becomes more important. Investments with the highest priority are those that provide companies with a tangible marketplace advantage rather than marginal savings or streamlining. But many network managers say they're struggling to quantify the real business return on technology investments and to convey that to upper management.

We believe this is one of the most important problems facing network executives, and we'd like to hear your opinions about it.

What problems have you struggled with in justifying network expenditures? How do you determine the business impact of technology investments? What are your success strategies for determining the real return on investment from key IS and network projects? What pressures are you facing from top management?

By establishing a dialogue on these issues in upcoming editions, we hope to help network executives deal with the problem of project justification. So drop a note to or call *Network World's* editor, or contact us through our electronic bulletin board system (see instructions in the Table of Contents).

We hope to hear from you.

OPINIONS

MANAGEMENT STRATEGIES

BY MARY JOHNSTON-TURNER

Before the RFP, know your outsourcing style

If you're a network manager, it is vital that the employees at your company, from the board level through junior operations staff, agree on what kind of outsourcing deal is in the company's best interests.

The following three gradations in service provide a useful starting point for selecting an outsourcing arrangement.

- **Outsourcing Level 1: Contract labor to provide a highly commoditized function.** This is typical of the application development world, where a specific job requires extra staff to complete the coding of a specific application program. The motivation for these agreements focuses on cost and limited end-user need for a specific skill.

Transfer of capital assets is not usually part of the agreement. The vendor is evaluated on specific and easily measured criteria, and the contracts can be rebid every few years with transfer from one vendor to another being virtually transparent to the end users.

- **Outsourcing Level 2: Strategic facilities management.** This type of contract is new to the marketplace. It focuses on off-loading personnel and sometimes capital in exchange for a guaranteed cost per port and predefined level of service. Outsourcing the network management operations center is one example.

This kind of deal usually focuses on off-loading internal manpower formerly used to provide the service in-house. It may include the transfer of capital assets. This agreement, however, requires the development of detailed service-level specifications, problem resolution processes and escape clauses.

The relationship in this type of outsourcing agreement is more strategic than in Level 1 since it often involves the end user gaining preferred customer status as well as access to the vendor's latest technologies. While the vendor is allowed to make technological decisions regarding delivery of specific levels of service, the user retains all title to strategic planning, design and the ultimate decisions on technical direction.

- **Outsourcing Level 3: The all-encompassing assignment of network and computing support to a third party.** This type of agreement is rare but is best typified by Eastman Kodak Co.'s recent award of data center support to IBM and network support to Digital Equipment Corp. In a Level 3 deal, the vendor becomes an equal partner in designing and developing the user's network or applications and computing environment.

The user may retain a small staff to check strategic decisions made by the vendor, but the vendor's staff is responsible for most of the technology analysis and planning. Today, outsourcing vendors — particularly those with a specific product or service to sell — seek this type of outsourcing arrangement, hoping the partnership will lead the user to buy more products or services in the future.

Level 3 deals are generally based more on a shared vision than on highly specified service contracts. In fact, they are designed to move the user's technological resources forward and could ultimately result in the vendor providing a service that was not envisioned at the outset of the contract.

Most users willing to enter into this type of arrangement do so to gain access to technological expertise and possibly to cut bloated internal staff. The relationship between the companies is often less adversarial than those in Level 1 or 2 deals.

It is critical to identify which level is right for your company. Many senior managers, believing that the network is too essential to the business, will refuse to consider outsourcing the tasks of strategic planning and design. Some organizations may consider a Level 3 outsourcing contract for voice but only Level 1 or 2 for data.

Many users are skeptical that any vendor can provide added value in the context of a Level 3 deal. They find it hard to believe that a third party can understand their business or respond more appropriately than internal staff. Specifically, these users must see proof that the vendor will value its partnership and that the user will indeed gain competitive technological advantage.

For any level of outsourcing, users must clearly understand their cost structures, service levels and network goals. They must also be clear about what they do and do not expect the vendor to provide.

The cost of the outsourcing proposal development and evaluation process is high for both the user and vendor. The vendor must rapidly learn a great deal about the user's network operation costs, performance levels and future expectations in order to develop a competitive and profitable bid. The user, on the other hand, must devote staff to developing cost and service information, as well as provide legal and staff support to the negotiation process. Most users find that they must limit discussions to two or three vendors.

Given the high cost of the exploration process, users must quantify and prioritize their goals before submitting an outsourcing request for proposal. Otherwise, they will inevitably lengthen the bidding process, and they could spend months of internal and vendor resources only to discover that outsourcing is not the answer.

The process is difficult enough when you know what you want at the beginning. Save some sleepless nights for both sides by doing your homework up front.

Johnston-Turner is a principal with Northeast Consulting Resources, Inc., a Boston consulting collaborative specializing in management, communications and information strategies.

LIKE ALLIGATORS IN A SWAMP, unforeseen problems can really put the bite on a communications operation. Many managers find themselves wrestling with these networking reptiles every day.

If you've survived an "alligator attack," share it with our readers by calling Susan Collins, assistant features editor, at (508) 820-7413, or fax your idea to us at (508) 820-3467. Alligators should be 1,200 words in length and submitted either on disk or via modem.

TELETOONS

BY FRANK AND TROISE

Network Manager's Handbook
Hint #22
How to tell when unauthorized people are reading things left on your desk:
Hey.. when did we switch to a standard-based, distributed architecture anchored by a fiber-optic Ethernet backbone?
Network Manager

LETTERS

A stickler for style

Author Henry Zalman must examine his own usage of "baud" as "an old telegraphy term, in use before the telephone was a gleam in Alexander Graham Bell's eye" ("Credibility hinges on using terms correctly," *NW,* Aug. 20). Like "Bel," Baud is short for a man's name, in this case Emile Baudot, a telegraphy pioneer. However, even my *Webster's New Collegiate Dictionary* lists Baud incorrectly.

Many years ago, an international convention set the standard that units of measurement involving a person's name, such as Bel, Volt, Baud, Amp and Hertz, are to be capitalized, whereas units not involving a person's name, such as inch, foot, second, bits and bytes, are to remain uncapitalized. Another convention adopted was that unit modifiers referring to more than one, such as KiloVolt for thousands of volts, would be capitalized. But singular modifiers, such as millisecond for one thousandth of a second, would be lowercase. Hence, KiloVolt, Megabyte, MegaHertz, deciBel, millisecond follow as do their abbreviations, KV, Mb, MHz, dB and msec.

I also question if the assignment of the term "Baud" to recognize Baudot's pioneering coding work really did precede Bell's telephone work, as stated in the column in question. Bell was 75 when he died in 1922, whereas Baudot died in 1903.

Perhaps the prevailing philosophy behind what Zalman states in his column truly represents our society's general value judgment process. But the bigger question is, "Should it?"

David Friedman
Systems Specialist
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San Rafael, Calif.

(continued on page 57)

Network World *welcomes letters from its readers.*

Letters should be typed and double-spaced. Send to Editor, Network World, *161 Worcester Road, Framingham, Mass. 01701.*

Letters may be edited for space and clarity.

IO ERROR
NETWORK DISK

ILLUSTRATION ©1990 GREG MACKEY

Network World and LanQuest

LAN TEST SERIES

Storage management

Continuous backup systems

By GEOFFRE SEELBACH

Worse than a crashed network on your day off is a crashed network on your day off with essential files lost.

Imagine the urgent calls to your home. Users shout that they are getting only "error writing to disk" on their screens. You rush to work and restart the server but find that several critical files, which were open when the tape backups were run, are gone forever.

A continuous backup system can prevent this scenario from happening. Many so-called continuous backup products are available, but some perform their functions only intermittently.

This article evaluates three continuous backup systems — Emerald Systems Corp.'s FullTime, Nonstop Networks, Ltd.'s Nonstop Network and Vortex Systems, Inc.'s RetroChron — and their role in providing fault tolerance in a network environment. Other products were considered for testing, including Cheyenne Software, Inc.'s ARCserve, Mountain Computer, Inc.'s FileSafe, and several from Alloy Computer Products, Inc., Colorado Memory Systems and Tallgrass Technol-

(continued on page 52)

Seelbach is a senior consultant with LanQuest Labs, a division of the LanQuest Group in San Jose, Calif.

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Mapping the future of computing and communications

CONTINUED FROM PAGE 1

dors, carriers and equipment vendors (see Figure 1, page 51).

After conducting these workshops for three years, we have documented several major shifts in thinking about the direction of the industry and drew up a short list of critical turning points, which we call events, to watch for during the next few years. (For brief definitions of some of the terms that appear in this article, see "Future Mapping terminology," page 49.)

The most desirable future

As part of our workshop, we ask participants to rank the five end states according to desirability. End State A, "a future dominated by standards," has consistently been identified by participants as a desirable outcome. However, as is shown in Figure 2 on page 51, End State C, "the future belongs to networking," has risen from fourth place in 1988 to first place in the most recent workshop. End State C's dramatic

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Herman, Johnston-Turner and Mason are principals at Northeast Consulting Resources, Inc., a Boston strategy and information technology consulting collaborative.

In a workshop setting, users and vendors voice their opinions on where the industry is headed.

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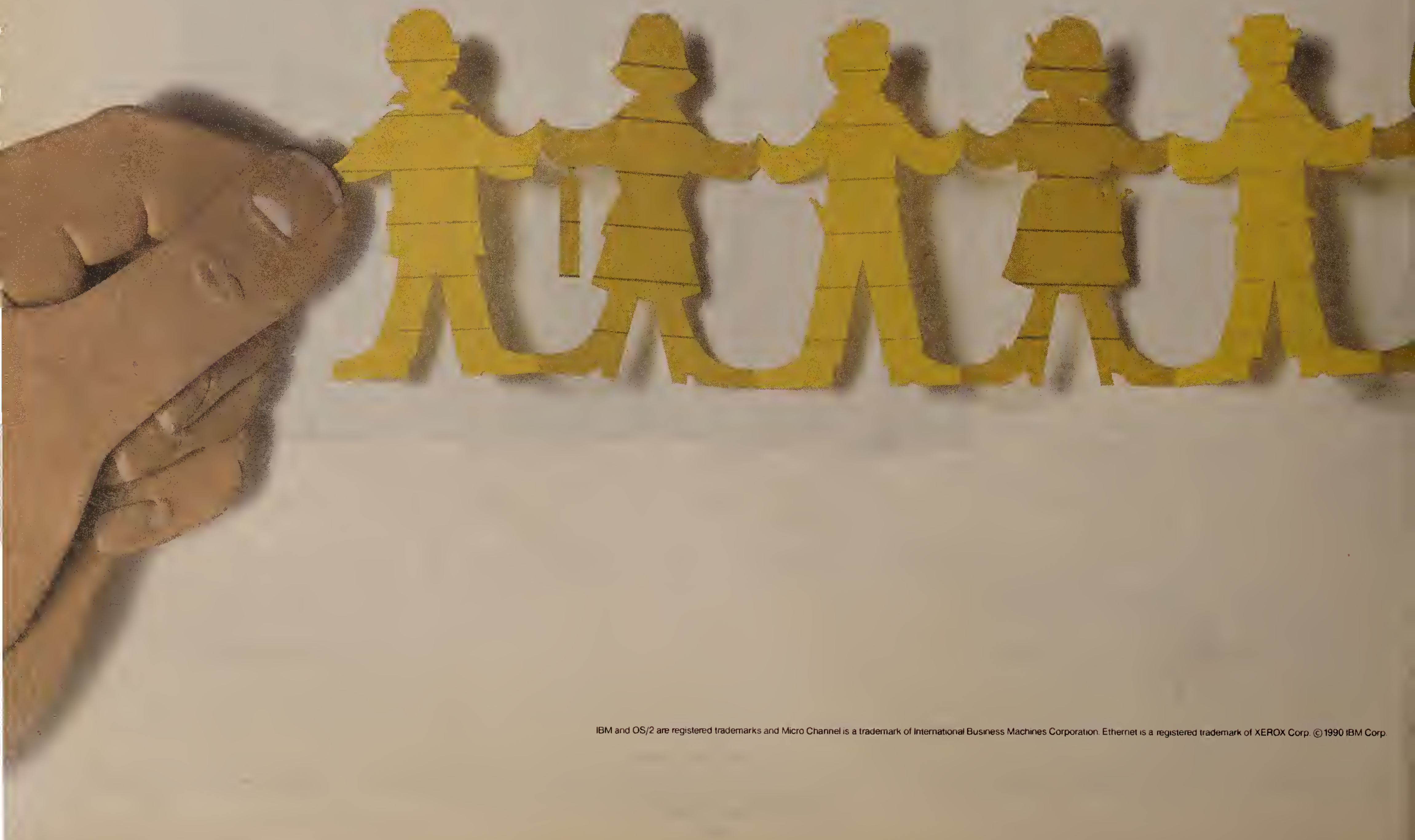

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(continued from page 47)

rise in popularity indicates that all major forces in the industry now view networking as a fundamental driver of change in the computer industry, along with the rise of the open systems movement.

We provide workshop participants with a large list of possible events, such as "Bank puts on-line transaction processing on a client/server system," that could happen over the next five years. The major task the participants face is to select a small subset of these events that are considered most critical to making the future turn out a particular way. This list of events is called a scenario. By studying which events are chosen most often and for which scenarios, we can analyze the participants' assumptions about which forces are driving the industry.

As the decline of End State B, "a future driven by new technology," from second in 1988 to last in 1990 indicates, new technology is not considered the primary driver of structural change in the industry. Events concerning standards elicit much more discussion and concern from workshop participants than any technology-related events.

In addition, participants consider practical implementation of standards for user interfaces, data networking, operating systems, network/system management and distributed data bases to be pivotal events in the evolution of a new, distributed, multivendor computing paradigm.

These standards-related events will make network-based, multivendor computing strategies practical for users and will encourage them to use a more diversified set of vendors. The workshop results clearly point out, however, that there are grave doubts about the standardization process and its ability to keep pace with technological change.

Events concerning applications are second in importance to those about standards. Applications sell technology. For the first few workshops, we provided many events about advanced technology, such as fiber-optic local-area networks, color flat screens and voice recognition, but did not include many events about applications. During the part of the workshop in which the participants must create events they think are missing, almost all of their additions turned out to be applications that would act as a driver to investing in new technology.

Although the success of standards is deemed probable by most of our workshop attendees, a growing minority of about 10% to 15% say they believe that proprietary systems will always offer better value to users. This is the basis of End State E, "the big players own the future."

Predicting a pivotal event

Throughout 1988 and the first half of 1989, one event appeared on the critical list in all of the workshops. This event posited the availability of a multivendor distributed application platform.

It was, therefore, very interesting to watch the Open Software Foundation (OSF) request for technology (RFT) process for a distributed computing environment. As soon as that RFT was announced, we knew OSF's decision would be the event our workshop results had been predicting. Lending further credence to the tenet that we had tied into a truly pivotal event were the strong rhetoric from the vendors making submissions to OSF and the extensive alliance activity that surrounded the process. The winning team included Digital Equipment Corp., Hewlett-Packard Co., IBM and others.

Most recently, we have been seeing a wave of interest in events concerning services rather than products. Most workshop participants expect vendors and carriers to stress services over products. Many users are finding that open standards give them more than enough rope to hang themselves in a confusing mess of multiple-vendor systems that are a nightmare to manage and support.

Systems integration, outsourcing of network and system management and consulting may be the new ways to forge close and durable relationships with key customers. In fact, the emphasis on services led us to add an event that is now frequently selected — the flooding of the service sector by too many new entrants.

As mentioned above, our workshop attendees have displayed a definite evolution in their thinking about achieving a new network-based model of computing.

(continued on page 51)

Future Mapping terminology

The following terms are used in the workshops on "Mapping the Future of Computing and Communications:"

- **End state.** An end state is a description of a particular state of affairs at the end of a time period. Written in sets, they represent an array of plausible circumstances. They are not forecasts.
- **Event.** An event is a onetime occurrence resulting from intervention by a firm or social institution. It's a manifestation of a trend in this industry. Industry participants have the power to influence whether an event occurs.
- **Scenario.** A scenario is a chronological list of events leading to a particular end state.

The list is chosen from a data base of possible events to form a plausible pathway to the future.

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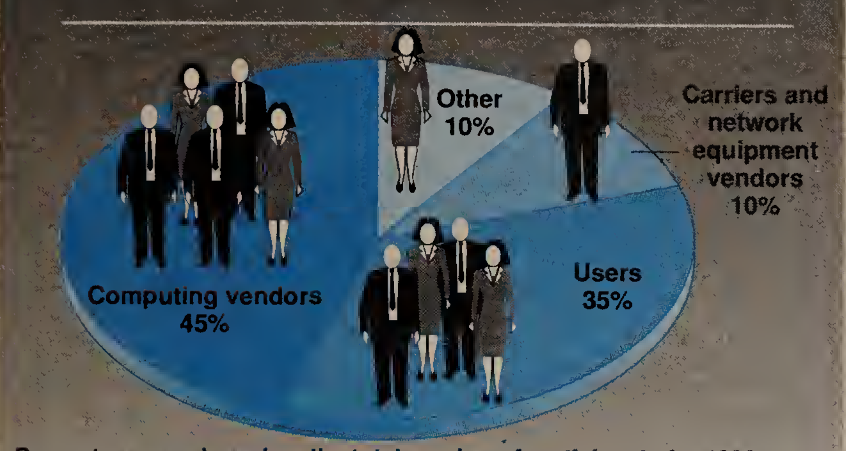

Future Mapping workshop participants

Percentages are based on the total number of participants for 1988 through 1990.

GRAPHIC BY SUSAN SLATER SOURCE: NORTHEAST CONSULTING RESOURCES, INC., BOSTON

(continued from page 49)

Specifically, in 1988, the public workshops identified five key events that, more than anything else, were general enablers moving the industry toward networking and would influence the future direction of the industry. They were:

- The success of Open Systems Interconnection.
- The success of the U.S. Government OSI Profile effort.
- The widespread implementation of Portable Operating System Interface, the IEEE standard for portability across diverse operating systems.
- The rise of powerful end-user computing tools and workstations.
- The development of multivendor distributed application platforms.

By 1990, public workshop participants began to focus more on specifics, such as applications, distributed data bases and application-enabling technology such as computer-aided software engineering (CASE). In February, the public group selected the following critical events:

- Standards efforts do not bog down.
- CASE propels progress toward distributed processing.
- Groupware products become common.
- True distributed data base management system becomes available.
- Heterogeneous distributed data bases become interoperable.
- Multiprocessor desktop computers become available.
- Multiple-protocol LAN interconnect nodes become widespread.
- Multivendor network management prevails.
- Regional Bell holding companies invest heavily in high-capacity physical plants.

The development and successful implementation of truly distributed applications and high-performance platforms on which to run them has become the dominant issue, along with the rise of high-capacity, interoperable networks.

Differences spell trouble

In running other workshops with computing vendors and separately with carriers and net equipment vendors, we have found a lack of commonality that makes it difficult for the two groups to work together to create seamless, integrated solutions. Two particularly notable points of divergence exist between the groups.

First, the two groups fail to see the need to pull together to create a favorable regulatory climate. If computing vendors believe that networking is truly critical to their success, it is in their interest to work closely with network providers to help speed appropriate Modified Final Judgment waivers and state-level regulatory approvals. Users that want to exploit the opportunities of networked computing also have a stake in building a nationwide broadband network.

Second, by refusing to cooperate with each other, the two groups will waste time and research and development funds on duplicate development efforts. It is in the carrier's best interests to team with computing vendors rather than to try to recreate in the public network capabilities that are already well-executed using existing computing platforms and software.

We have been surprised by the widespread belief among our workshop participants that high-speed networks will be available where and when they are needed. Our experience is that the last-mile problem is still the most difficult one for enterprises planning networks supporting new types of LAN-based, distributed computing.

The lack of uniformity in services planned by the RBHCs and the discrepancies between interexchange carrier and local exchange carrier services are serious obstacles to creating the type of network infrastructure most workshop participants envision. Divestiture may have created a competitive environment that lowered the cost of voice communications, but it has seriously complicated the development of nationwide computing utilities.

We have been even more surprised by the general lack of interest within the RBHCs in developing the broadband network to support distributed computing. Most middle managers and planners at the RBHCs seem to dismiss data applications as either too small a market or the unassailable province of the computer vendors. Unfortunately, few of them understand what distributed computing is all about.

Looking into the '90s

These workshops indicate that a networked future, flavored heavily with standards and the rise of powerful desktop platforms, is the most likely outcome for the 1990s. To succeed in that environment, users, regulators, network providers and computer vendors must begin to share the same language and planning assumptions.

Progress in this area is already being made. For example, cisco Systems, Inc., DEC, Northern Telecom, Inc. and Nynex are already mounting joint efforts to develop a frame relay standard, conduct trials and assess frame relay application opportunities. Large users must also get into the act.

Those companies that do not invest in learning about and working with the other side of the industry are likely to miss out on major innovations until it is too late to capitalize on them. In the 1990s, success will require technological and marketing alliances between vendors and carriers, as well as partnerships with user organizations. Users will want to see complex requirements addressed as integrated system solutions rather than piecemeal approaches. Teamwork is the only answer. ■

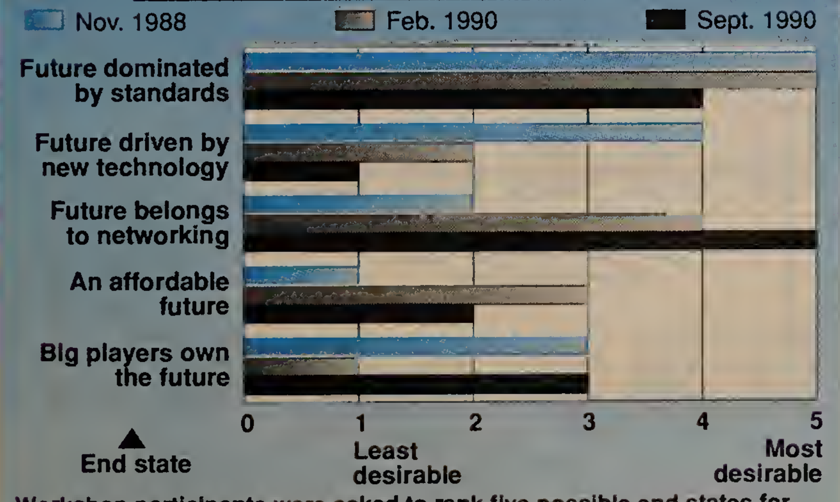

Changing visions of the future

Figure 2

Workshop participants were asked to rank five possible end states for the computer and communications industry in the 1990s.

GRAPHIC BY SUSAN SLATER SOURCE: NORTHEAST CONSULTING RESOURCES, INC., BOSTON

Five end states for 1996

Computing vendors, carriers and users have widely divergent views on how the computer and communications industry will look by the mid-1990s. These views form five possible end states:

- **End State A: A future dominated by standards.** Proprietary processing and network architectures have faded. International standards have made multivendor solutions practical and popular. Users have been willing to give up fast-forward technology for reduced complexity and increased ease of installation and use.

The adoption of standards has allowed electronic data interchange, distributed data bases and electronic mail to reduce the paper content of business significantly. The open market fostered by standards has brought prices down and shifted competition to the application software level. Being small, specialized and responsive or being large with production scale advantages are the key means of survival as margins erode. The Far East is steadily increasing its hardware market share.

- **End State B: A future driven by new technology.** Information technology has been on fast-forward for the past seven years. Flat screens, speech recognition, image processing, expert assistants and compound documents have redefined the way users interact with computers and networks. Fiber-optic networks have made image transfer quick and inexpensive. Radical new computer architectures make modeling, simulation and computer-assisted design applications popular.

Embedded computers have infiltrated everyday life. Large segments of the population have become first-time users. Most organizations have willingly made major changes to their information systems architectures to exploit the latest technology and gain competitive advantage. Aggressive start-ups fuel most of the innovation while the big vendors remain bogged down in supporting their installed bases.

- **End State C: The future belongs to networking.** The concept of discrete computers faded as the network computing model took hold. With LAN and bus speeds equalized, networked machines function as distributed parallel processors. On-line directories that include objects, people, data bases and computing resources guide users and agents through a global information utility. Groupware applications allow distributed teams to work together.

Major changes are taking place in business as networks allow direct interaction between producers and consumers and major reductions in middle-manager functions. Public networks offer all forms of processing and storage with major economies of scale. Small firms use the highly interconnected global internet as a marketplace for new applications and information services.

- **End State D: An affordable future.** The economic logic of moving most applications to inexpensive distributed platforms is now inescapable. Most businesses have converted to high-powered personal computers and servers tied together on LANs, which can be incrementally expanded to meet new needs. At least three generations of incompatible equipment are maintained in most environments, making system management an onerous task.

Off-the-shelf- and end-user-generated applications account for most new software. Low cost, ease of use and flexibility are key attributes of winning products. Economies of scale and effective distribution are key competitive advantages. The slow U.S. market is pushing vendors to sell overseas, resulting in fierce political pressure to protect domestic firms.

- **End State E: The big players own the future.** Intense consolidation on a global scale has reduced the number of broad-line information technology suppliers to six multinational giants. Large differences among vendors persist as the need for return on research and development investment drives proprietary strategies. Proprietary systems stay ahead of standards-based systems through advanced technology, better integration and broader functionality.

Users prefer packaged solutions over standards-based, do-it-yourself systems. After painful experiments with user-generated applications, mission-critical systems are centrally developed and operated. Proprietary architectures have left successful vendors with power over suppliers and customers; they also create high barriers to entry.

— James Herman, Mary Johnston-Turner and David Mason

Continuous backup systems

continued from page 45

Continuous backup systems

Company	Product	Other equipment required	Setup time	LAN type supported	Network operating systems supported	Servers supported	Price
Emerald Systems Corp. **San Diego** **(619) 673-2161**	FullTime	386-based system with 2M bytes of RAM, Small Computer System Interface tape drive, 40M-byte hard disk	1.75 hours	Ethernet, token ring, Arcnet, others	Novell, Inc.'s NetWare 386, NetWare 286	8	$1,495 to $7,995, depending on configuration
Nonstop Networks, Ltd. **New York** **(212) 481-8488**	Nonstop Network	None	1.25 hours	Ethèrnet, token ring, Arcnet, others	All systems that provide DOS disk emulation	Up to 13 emulated DOS devices	$1,290 for first 5 nodes, $25 each for next 20 nodes, $15 each for next 75 nodes, and $5 each for each node after the first 100
Vortex Systems, Inc. **Pittsburgh** **(412) 322-7820**	RetroChron	40M-byte control disk, backup disk (must be twice the size of the primary disk)	2.25 hours	Ethernet, token ring, Arcnet, others	NetWare 386, NetWare 286, 3Com Corp.'s 3+, DOS	1	$4,995 to $5,995, depending on configuration

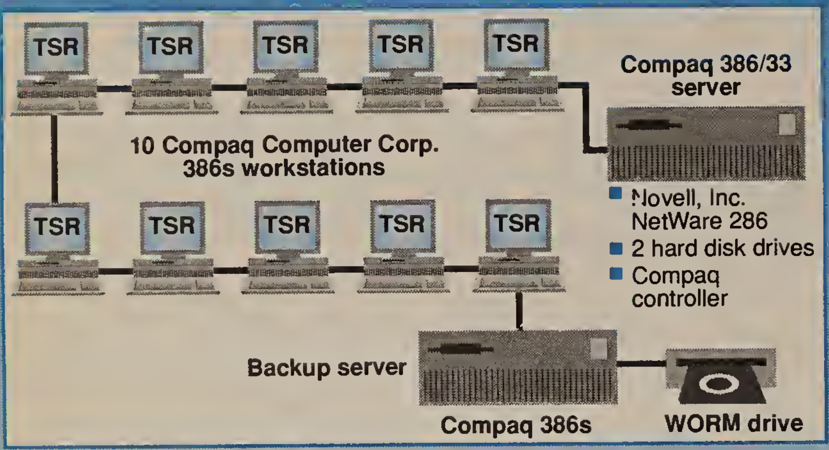
GRAPHIC BY SUSAN SLATER SOURCE: LANQUEST LABS, SAN JOSE, CALIF.

ogies Corp. These were not tested or discussed in this article because they did not fall under our definition of continuous backup: The product must capture, in real time, all information written to the disk. Cheyenne Software's ARCserve, for example, sets a schedule of frequent backups but does not keep a continuous record of every instruction.

Since the three products tested address various user needs and are fundamentally different in architecture, comparing their performance against one another is less relevant than the percent of degradation that each causes to the network. One product is based on an ordinary local-area network file server, another runs in a server dedicated solely to backup, and the third is a software-only implementation that runs in each workstation.

FullTime test bed

Figure 1



Emerald Systems Corp.'s FullTime stores disk writes on a write once, read many times (WORM) drive. Since such drives are relatively slow, the system uses a 40M-byte hard drive as a buffer.

TSR = Terminate and stay resident

GRAPHIC BY SUSAN SLATER SOURCE: LANQUEST LABS, SAN JOSE, CALIF.

This article will, therefore, be based on the actual experience of the testers in setting up each configuration and what was learned during the testing process to determine how well the product performs its backup function. Before describing these performance evaluations, we will discuss the products' different features, applications and methods of operation.

Defining continuous backup

A continuous backup system is a utility that replicates all changes that are written to a disk as they are made. These systems do not necessarily replace the traditional tape-oriented backups that most network managers depend on today. Rather, they supplement tape backup.

However, there are problems with traditional backup methods. Such backups often skip files that are in use when the backup routine is trying to copy them. Since traditional tape backup doesn't capture incremental changes to a file as they occur, an operator can't restore a file to its current condition. The file can only be restored to the condition it was in when it was last backed up.

In addition, traditional tape backup does not provide system fault tolerance. If the server drive fails, the system fails and can't be used until the server drive is repaired or replaced and the data files are restored.

Continuous backup systems often have built-in fault tolerance, enabling them to remain operational when the primary disk drive or, in some cases, the primary server, fails. This is a great benefit to companies that depend on their systems for mission-critical applications.

Also, continuous backup systems enable the net manager to restore files to the exact condition they were in when the system failed. And since continuous backup systems capture every change to a file, backing up open files should never be a problem.

Although RetroChron, FullTime and Nonstop Network all provide continuous backup, they are conceptually very different (see chart, this page).

A look at RetroChron

Vortex's RetroChron consists of a 16-bit adapter board with a bus based on the Small Computer System Interface (SCSI) and storage management software. Three versions of the product are available. One supports Novell, Inc.'s NetWare 386 as a NetWare Loadable Module/value-added disk driver (VADD), the second supports NetWare 286 and runs as a VADD, and the third is a single-user version of the product.

Using RetroChron requires the use of three disk drives: the server's primary drive, a control drive and a backup drive. The primary drive must be a Winchester drive, configured as a NetWare Volume, which is the shared disk that is located in a NetWare file server. The control drive is a 40M-byte Winchester drive used to buffer writes to the backup drive. The backup device can be either a Winchester, an erasable optical drive or a write once, read many times optical drive.

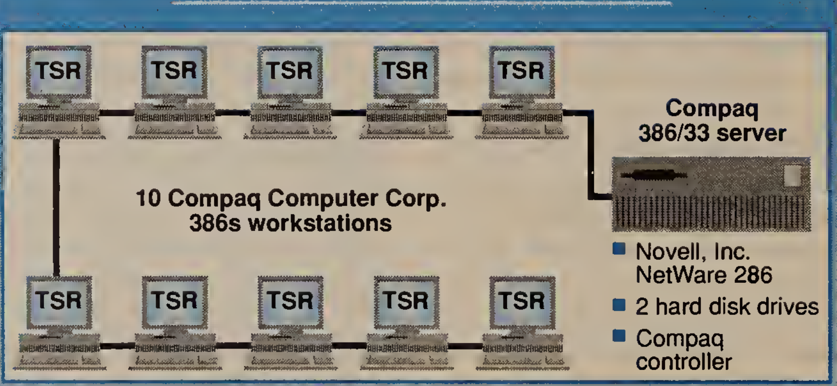
RetroChron's software runs only in the file server, where it records all disk write activity to the backup disk. Thus, the backup system's overhead will affect LAN performance at the server rather than at the nodes.

The basics of FullTime

Emerald Systems' FullTime uses either ¼ in. tape or digital audio tape drives connected to the backup server across an SCSI bus as its magnetic memory device. The software turns an 80386 system into a backup server on a Novell network. The system duplicates all network disk write activity on the tape drive.

Nonstop Network test bed

Figure 2



If the server's primary hard disk fails, Nonstop Networks, Ltd.'s Nonstop Network automatically switches to a backup drive to store disk writes.

TSR = Terminate and stay resident

GRAPHIC BY SUSAN SLATER SOURCE: LANQUEST LABS, SAN JOSE, CALIF.

FullTime requires a host hardware platform comprising an 80386-based workstation with at least 2M bytes of random-access memory equipped with either an Adaptec, Inc. or a Western Digital Corp. SCSI host adapter, an SCSI tape drive and an SCSI hard disk with a minimum of 40M bytes of RAM to serve as a buffer to the tape drive.

FullTime relies on the Novell Sequenced Packet Exchange protocol to transmit all disk write activity to the backup server. Therefore, it runs only on Novell networks.

Because FullTime relies on a dedicated backup server, no file server degradation can occur. However, degradation can occur in network bandwidth usage because each disk write will be retransmitted over the network cable.

Nonstop's configuration

Nonstop Networks' Nonstop Network is a software-only product that works in both single-user and network environments. It uses standard DOS disk requests and, therefore, isn't tailored to any particular network operating system.

If a nonrecoverable disk error occurs, Nonstop Network notifies the user that the primary drive is unavailable. Then, at the user's option, processing can continue on data from the secondary drive. Thus, unlike the procedure with FullTime and RetroChron, the user must be involved in the changeover to the backup system.

Nonstop Network has various levels of fault tolerance. Level 1 duplicates disk writes on one disk drive and protects data in case of disk medium failures, such as bad surface locations.

Level 2 duplicates disk writes on two separate disk drives. This can be configured as disk mirroring, where both disks are on the same channel, or disk duplexing, where each disk is on a separate channel.

Level 3 duplicates disk writes on separate servers. This protects the system from a complete server failure.

Product feature analysis

With RetroChron, backup and archiving are automatically done in background mode on the file server. At start-up, a baseline image of the primary drive on the server is copied to the backup disk, and the server is then booted. As disk write activity occurs, changes are written to the backup disk. This allows RetroChron to re-create an image of the disk as it existed at any point in time from when the baseline image was made to the present.

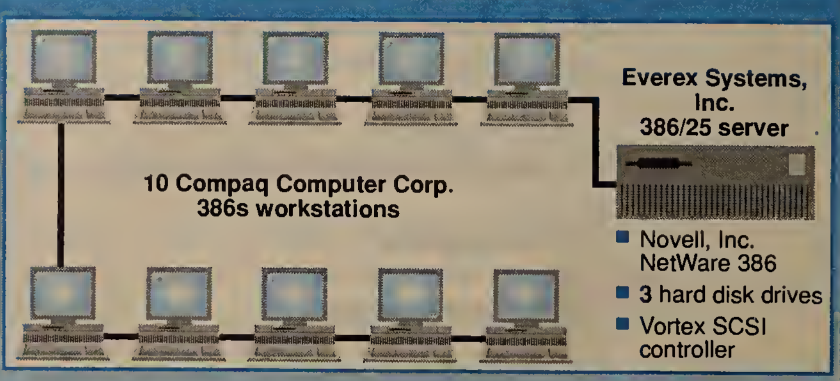
RetroChron costs $4,995 for a DOS-, NetWare 286- or 3Com Corp. 3+-compatible configuration and $5,995 for one that works with NetWare 386. The price includes the controller and storage management software.

FullTime resides in a dedicated backup server. Like RetroChron, FullTime makes a baseline image of the network server

(continued on page 54)

RetroChron test bed

Figure 3


Everex Systems, Inc. 386/25 server
10 Compaq Computer Corp. 386s workstations
Novell, Inc. NetWare 386
3 hard disk drives
Vortex SCSI controller

Vortex Systems, Inc.'s RetroChron uses a small controller drive and an additional hard drive to store all disk writes to the server's drive.

SCSI = Small Computer System Interface

GRAPHIC BY SUSAN SLATER SOURCE: LANQUEST LABS, SAN JOSE, CALIF.

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(continued from page 52)

drive on the backup drive. Thereafter, backup is automatic and continuous. All disk writes that modify the files stored on the network server are saved as discrete events to the backup server.

To restore a specific file to the state it was in at a particular time after the baseline image was created, the network manager must run a utility that provides the system with the time, date and file required. The restoration process then occurs automatically.

Usability analysis
Figure 4

	Vortex Systems, Inc. RetroChron	Emerald Systems Corp. FullTime	Nonstop Networks, Ltd. Nonstop Network
Ease of installation	6	8	8
Ease of use	5	6	7
Flexibility	7	6	8
Documentation	4	4	6
Technical support	8	8	6
Restoral	5	4	4

Ratings key: excellent, 9-10; good, 6-8; fair, 3-5; poor, 1-2

SOURCE: LANQUEST LABS, SAN JOSE, CALIF.

Since the backup system is not resident in the network server, FullTime does not allow for fault tolerance or continuous network operation when the server drive fails.

The reliance on terminate and stay resident (TSR) software programs, which reside in each workstation's memory, can be a potential operational problem. If one station in a network doesn't have the TSR loaded and makes changes to a communal file, the backup system will not record these changes and any restoration of that file will be incorrect. This could be a major issue with a shared data base file.

FullTime's price ranges from $3,295 for a 250M-byte capacity system to $7,995 for a 2.2G-byte system, including a controller, drive and software. The software alone costs $1,495.

Nonstop Network uses a TSR in each workstation to direct a second write to any DOS random-access device located on the network. Therefore, the secondary image can be located on an alternate net server volume or any other logical network volume. For instance, it could be a drive on another server, a local drive or a mainframe.

Since Nonstop Network is based on standard DOS requests, it can be used to back up a single DOS workstation to a second drive on the workstation or to a designated DOS drive on a network server.

Like RetroChron and FullTime, Nonstop Network starts by making an image copy of the primary drive's files. But unlike the other two, these images are not maintained as baselines. Instead, they are updated continuously. Therefore, unlike the other two products, Nonstop Network cannot restore files to a specific point in time.

If the primary or secondary drive fails, the system automatically switches to the remaining drive, notifies the user that service is proceeding on the secondary device and asks if the user wants to continue in that mode.

Nonstop Network works with several operating systems supporting DOS-based clients, including NetWare 286, NetWare 386, Banyan Systems, Inc.'s VINES, 3Com's 3+ and 3+ Open, Artisoft, Inc.'s LanTastic, 10NET Communications' 10NET, IBM/Microsoft Corp.'s LAN Manager and Sitka's TOPS.

Nonstop Network costs $1,290 for five nodes, an additional $25 each for the next 20 nodes, $15 each for the next 75 nodes and $5 each for every node beyond that.

Testing the products

Our test was designed to evaluate each product's ease of installation, its operation in a network and how much its presence on the net degraded server or network performance.

Our test bed was an Ethernet LAN configured in standard bus layout using thin coaxial cable (10Base2). To this was attached a Compaq Computer Corp. 386/33 file server running NetWare 286 with 10 Compaq 386s workstations.

The reliance on TSR software programs, which reside in each workstation's memory, can be a potential operational problem.

▲▲▲

The Compaq 386/33 was used to test FullTime and Nonstop Network (see Figures 1 and 2, page 52). It was equipped with its own disk controller using Compaq's controller system, known as Integrated Drive Electronics. In testing the FullTime system, we also added one Compaq 386s to act as the backup server.

The RetroChron hookup used the Vortex SCSI disk controller and three hard disk drives. It came preinstalled in an Everex Systems, Inc. 386/25 file server running NetWare 386, which we used instead of the Compaq server (see Figure 3, page 52).

Each continuous backup product was tested and subjected to stress using the LanQuest Applications Benchmark Test Series. This consists of loading Microsoft Word onto each workstation. Then each station, in sequence at one-second intervals, opens a 2,000-byte document file and saves it 50 times under different file names. Thus, each test generated a total of 500 new files.

Each test was run twice with the continuous backup system operating and twice with it turned off to measure the impact of the backup system on the network and server. The time to test completion was used to measure the performance of each system. Each workstation did the clocking.

To test fault-tolerant operation, a special power circuit with a manual on/off switch was attached to the server's primary drive. This allowed us to simulate a primary drive crash.

This crash simulation was tested on RetroChron and Nonstop Network, which were the only products we tested that have fault-tolerant features or nonstop processing as a feature. FullTime does not claim to be fault tolerant; it saves the network's data but doesn't keep operating.

Rating methodology

The ratings in Figure 4 on this page represent an analysis of the products based on the hands-on experience of the test team. They are a combination of objective and subjective impressions of the products, based on the test team's experience and observations.

Using a 1-to-10 rating scale (1 being the lowest, 5 slightly below average and 10 the highest), each product was graded on every category relative to the other two products tested. The members of the two-person LanQuest test team independently rated the products. The ratings were averaged, producing the scores shown in the table.

In conducting the test and performing the evaluation, both participants repeated each process. For example, two setups were performed — after the system was put together by the first tester, it was taken apart so that it could be reassembled by the second tester.

Six rating categories were selected: ease of installation, ease of use, flexibility, documentation, technical support and restoral. Restoral was the crux of the test — the product's ability to bring back files that might have been lost.

Ease of installation was evaluated by tabulating the complexity involved in installing and configuring the product. Low complexity leads to a high rating. The ease-of-use category is an evaluation of the system's user interface and general workability. Flexibility represents an assessment of how well the product can be configured to support a variety of system configurations.

Documentation is a measure of the accuracy, organization and explanation of topics, including concepts and procedures. Technical support is a measure of the perceived competence of the technical support representatives and their responsiveness. Vendor support personnel were called at their technical support numbers, and each was asked to explain how the product works.

FullTime's test results

No problems were experienced with the FullTime product. Our test of net degradation with the product showed that it caused a loss of 47%, which means the tests took 47% longer to complete than the baseline setup.

In the flexibility column, FullTime scored a relatively low 6, compared to RetroChron's 7 and Nonstop Network's 8, because the only network operating systems FullTime supports are NetWare 286 and NetWare 386.

FullTime's documentation received a low score of 4 because the testers believe that some points in the manual may no longer be accurate. In any case, they found that the written instructions differed from the information from the telephone support staff. However, FullTime's support staff was very responsive to phone calls and seemed able to discuss their product clearly.

FullTime's restoration capability was rated at 4, which ties with Nonstop Network as the lowest rating, because the command sequence involved in restoring files was extremely complex.

Nonstop Network results

No problems were experienced with the Nonstop product during regular operation. Network degradation over multiple test iterations was less than 1%.

In ease of installation, Nonstop Network tied FullTime with a score of 8. Nonstop Network's installation time was approximately one hour and 15 minutes. Although this time was shorter than FullTime's installation period, this was a test of complexity as well as setup time. We judged that Nonstop Network requires knowledge of DOS but only minimal network knowledge to install the product.

Nonstop Network garnered the highest score in ease of use, again because its software implementation requires little experience other than working with DOS. The product also received a high score for flexibility, mainly for its ability to work with virtually any LAN operating system that supports DOS. (The net operating system need not be based on DOS; it must only be able to work with it.)

For documentation, Nonstop Network scored higher than FullTime and RetroChron. The information presented was accurate and adequate, though perhaps not as clearly written as it might have been. Still, the manual did present a good conceptual overview of Nonstop Network's operations.

When we contacted Nonstop Networks' technical staff, we found them knowledgeable and able to communicate easily. However, getting through to Nonstop Networks was somewhat more difficult than reaching the other two firms; frequently, the line was busy. Thus, it received a lower technical support mark.

Using a 1-to-10 scale, each product was graded on every category relative to the other products.

▲▲▲

RetroChron test results

The RetroChron system came with NetWare 386 Version 3.0 installed. However, a software bug prevented proper operation of the 3.0 software.

We were unable to determine whether the bug was in the RetroChron disk driver or in the NetWare version. On the recommendation of Vortex's support personnel, we upgraded to NetWare 386 Version 3.1. This required installing new Vortex disk drivers, which we accomplished by downloading new disk drivers from the Vortex bulletin board. The upgrade solved the problem.

The system survived the simulated primary disk crash flawlessly, switching to the backup drive when the crash occurred.

Network degradation with RetroChron in operation was measured at 8%. However, RetroChron scored only a 6 in ease of installation, the lowest of the three, because it required two hours and 15 minutes to set up. This included the reinstallation of NetWare because RetroChron uses a proprietary disk controller.

RetroChron scored only a 5 in ease of use, again the lowest of

(continued on page 57)

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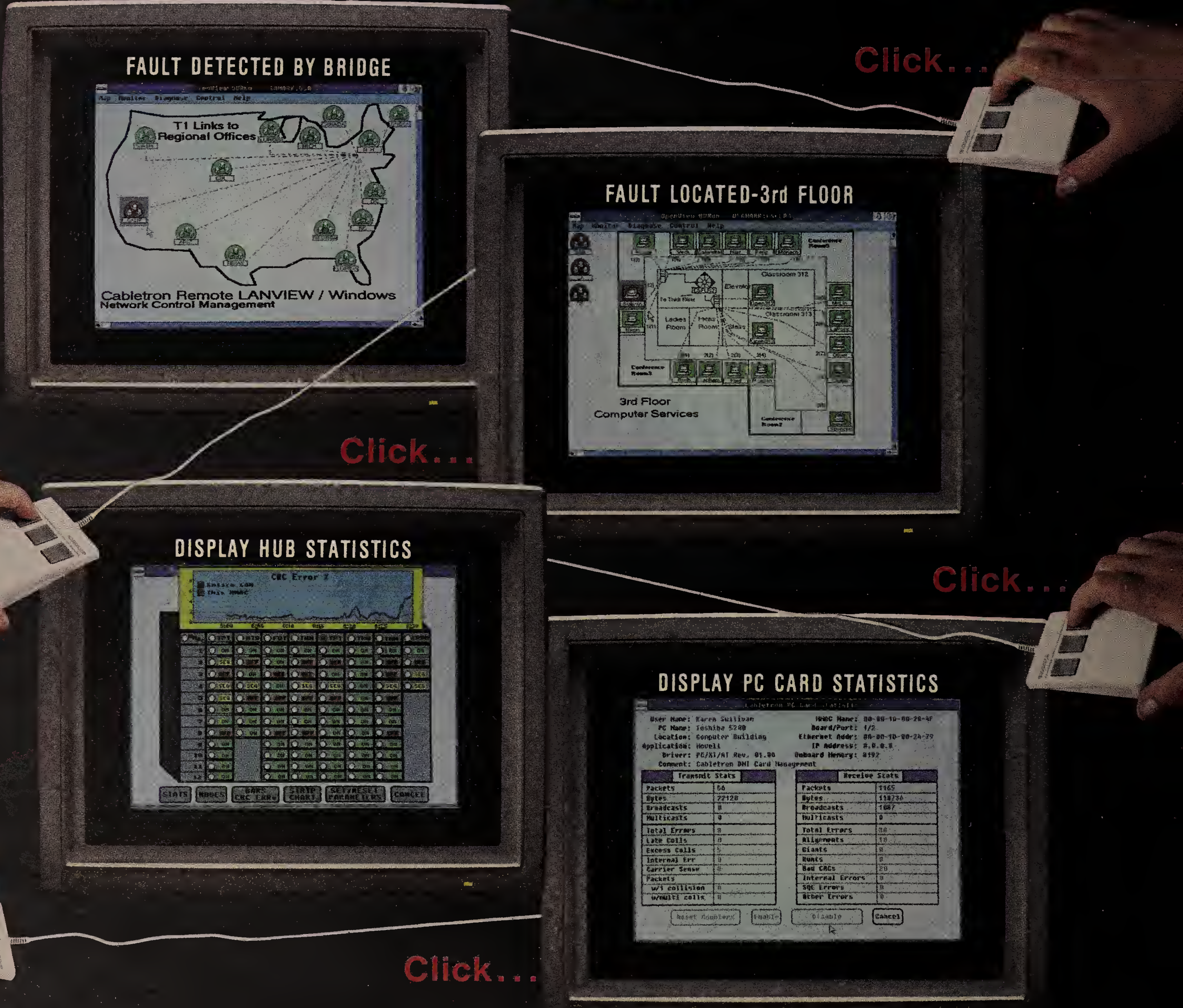

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Continuous backup systems

continued from page 54

the three products, because it has its own terminology that must be learned before the product can be operated.

In the flexibility column, RetroChron scored a 7 due to its ability to support NetWare 286, NetWare 386, 3+ and DOS, though not as many LAN-related products as Nonstop Network.

We felt that RetroChron's documentation was poor at explaining concepts, such as how the product functioned from a top-level view. By contrast, the company's technical staffers were very knowledgeable, winning RetroChron an 8 for technical support.

RetroChron's restoral score of 5 was slightly better than the other two products' scores. On the other hand, none of the three products presented a particularly impressive restoration capability. A criticism that can be aimed at all three products is that they use prolonged procedures that are too complex.

One obvious explanation of why restoral is a difficult technique to master is that it is rarely performed. Hence, end users get little chance to practice the commands. Some form of on-line help would be ideal to counteract this problem.

Conclusions

Continuous backup systems do not replace traditional tape backup. For the most effective support, they should be combined with a rigorous, scheduled tape backup system that includes off-site storage of at least one set of backup tapes.

If you want a single-package solution for a NetWare system, RetroChron is the logical choice. It offers continuous backup, the ability to restore files to a specific point in time and fault tolerance. Our only concern with this product is that it uses a proprietary drive controller. If the controller fails, replacing it may be a problem. In addition, RetroChron may degrade server performance because it is server-resident.

None of the three products presented a particularly impressive restoration capability.

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For a single, seamless, continuous backup system that supports multiple platforms and network operating systems, Nonstop Network is an excellent choice.

In our opinion, FullTime is the most cost-effective choice for continuous backup if you're looking to back up volumes on multiple network servers. One FullTime backup server can continuously back up multiple servers and restore files to any requested point in time.

However, it should be noted that none of these products provides adequate support for off-site backup. We strongly recommend that use of any of these products be augmented by a rigorous off-site backup program.

In choosing among these continuous backup products, the user's selection will depend primarily on the network's specific needs and the relative effects of a disk, server or network failure on the system.

Letters

continued from page 43

E-mail invasion

I'm writing in response to your editorial, "E-mail messages should be kept private" (*NW,* Sept. 24). Because the facility is owned by the company, the company has the right to set the rules. However, if the company doesn't rule in favor of keeping electronic mail messages private, employees will simply use other means of communications, such as the telephone or the U.S. mail.

If the problem is trade secrets and such, who's fooling who? Employees who would violate the confidence of their positions will find a way to do so without being discovered.

Some companies must monitor phone calls to maintain service standards. If E-mail is used for such a purpose, it must be monitored also.

The key is that everyone should know and abide by the rules. If the company rules in favor of privacy, absolutely no one should be allowed to violate it.

If the company rules that E-mail or telephone communications may be monitored, it has an obligation to make non-monitored phones available for personal emergencies.

I support the privacy of E-mail and telephones when the need to monitor service is not involved. At the moment, I can think of no other reason to monitor communications.

There is never a good reason to violate an individual's privacy.

William Lee
Independent consultant
Weltec
Brentwood, Mo.

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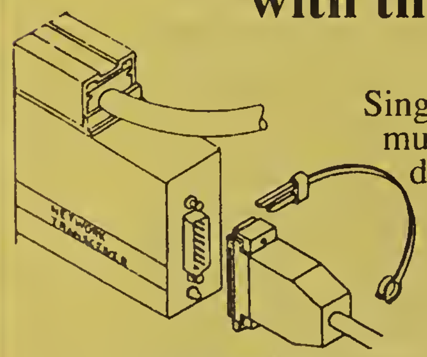

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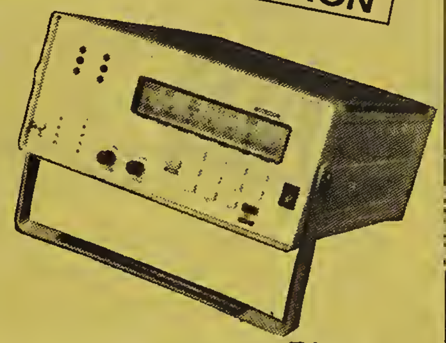

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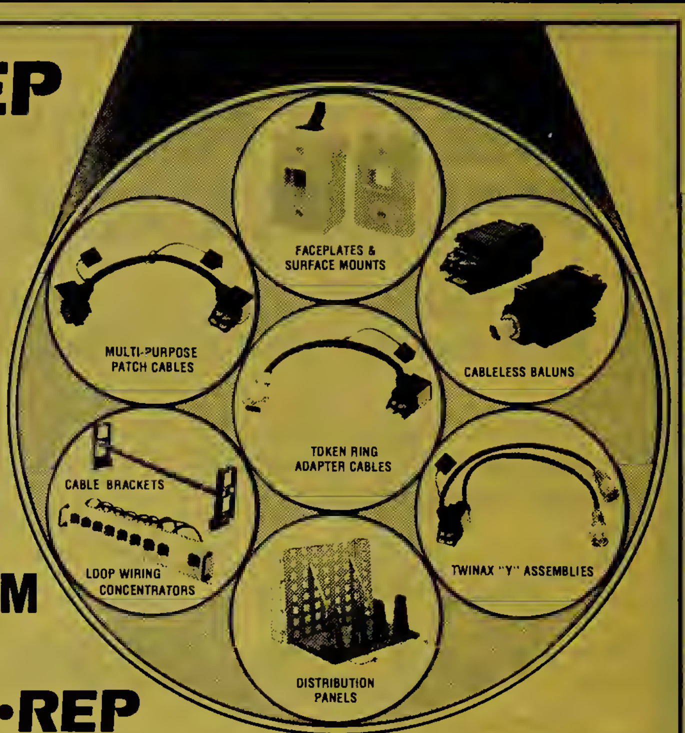
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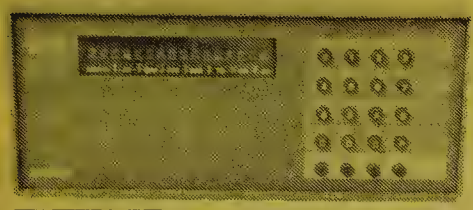

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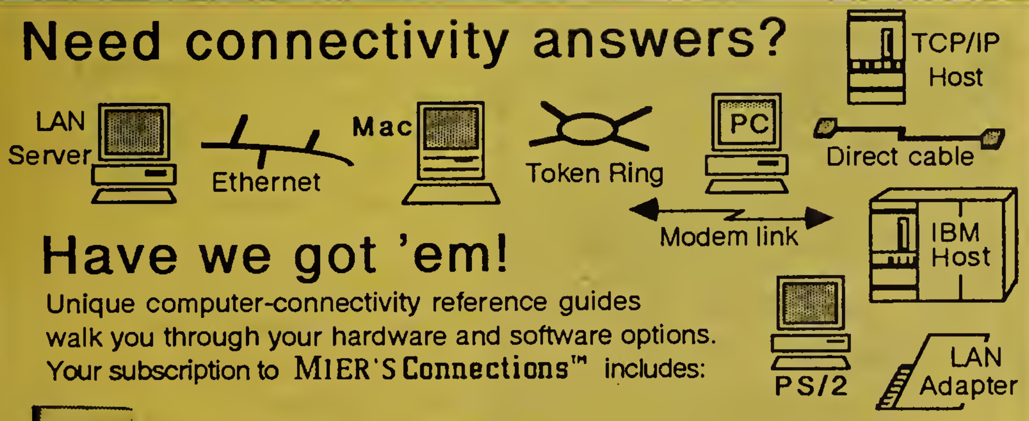

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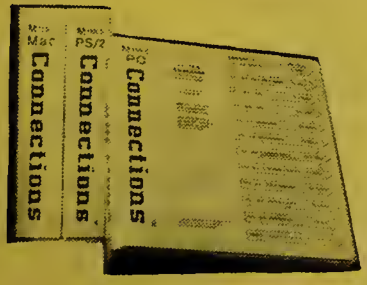

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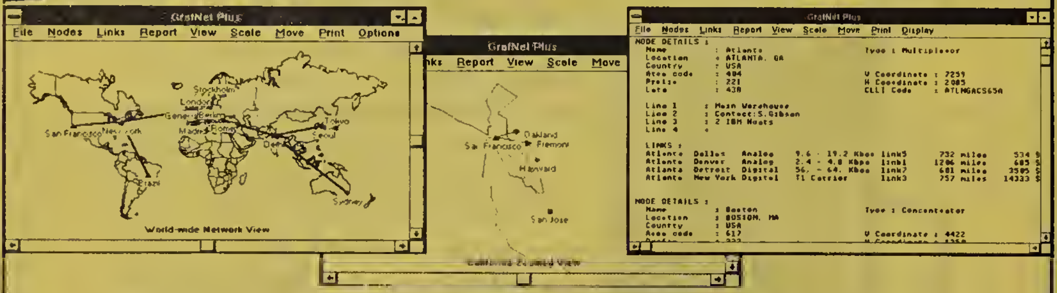

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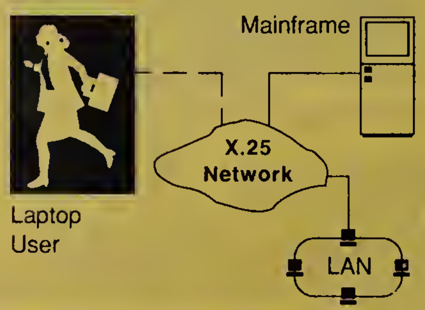

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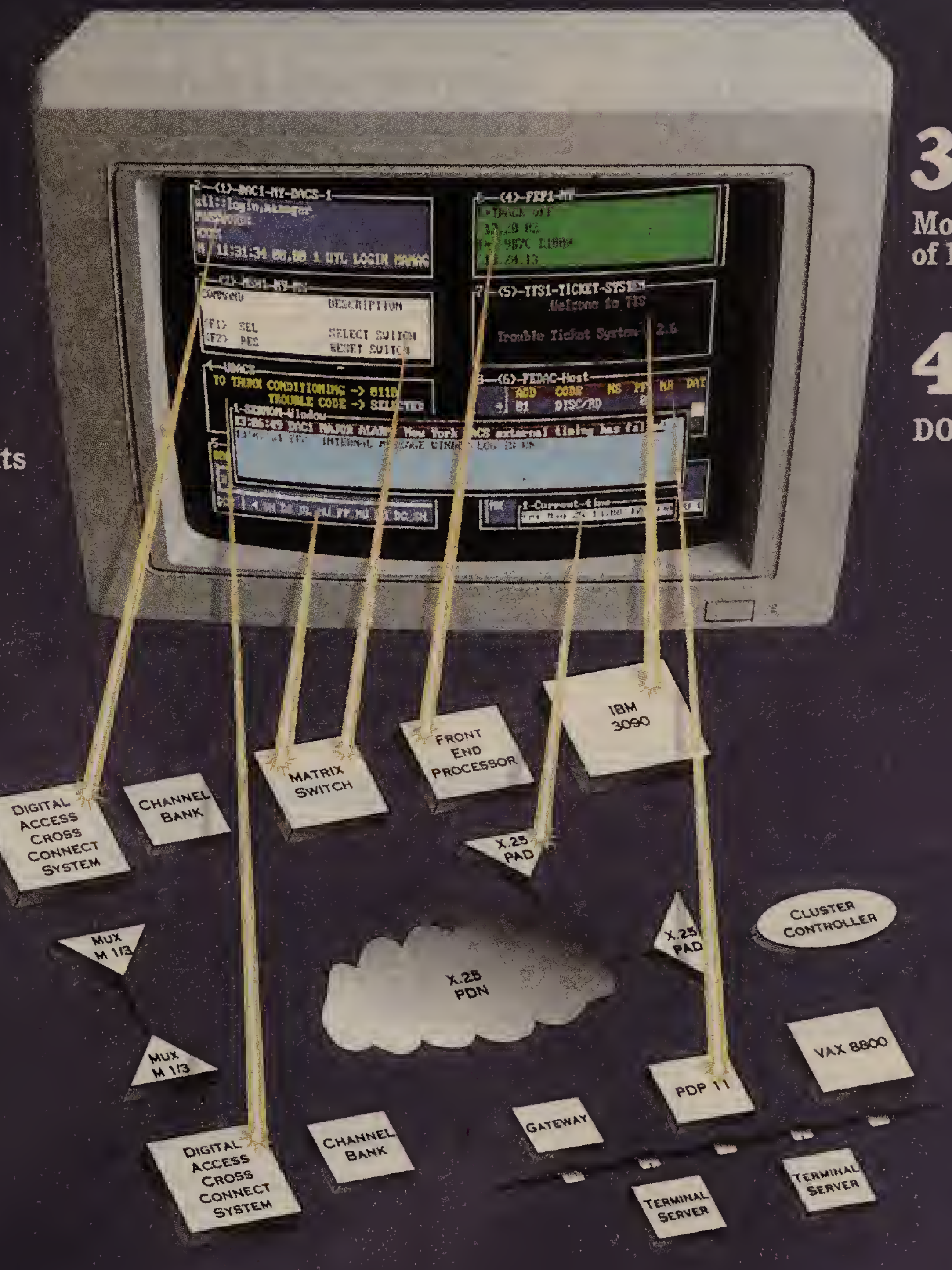

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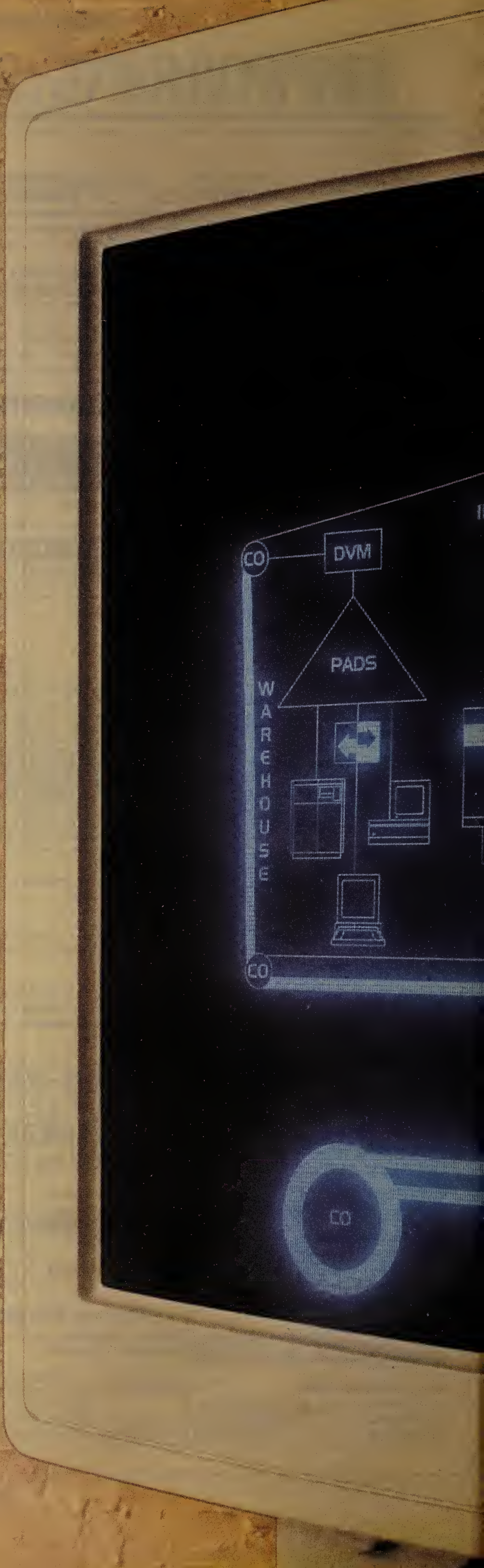

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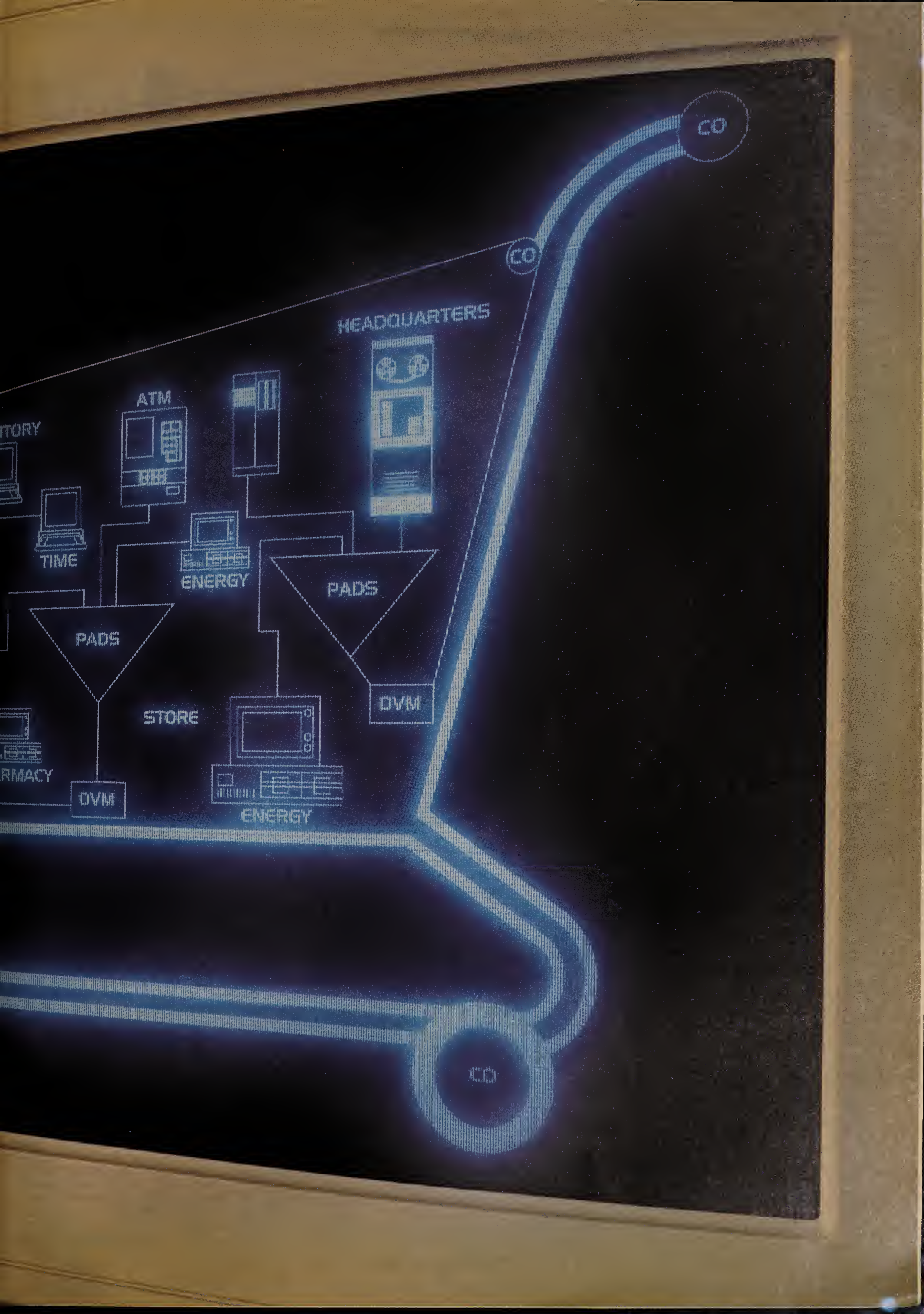
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WATS eclipsed, virtual nets rise

continued from page 1

future direction of all three carriers is virtual network services," said Thomas Walton, president of Walton and Walton Associates, Inc., a consultancy in Richmond, Va. "Their strategy is to move customers as quickly as possible from other services to virtual networks and lock them in with long-term contracts."

Although carriers say they will continue to offer WATS services, most admit the offerings will play a diminishing role in their long-term network strategies.

John Crooks, senior manager of virtual network marketing for MCI, said the carrier is actively migrating WATS users to Vnet, its virtual network service, to offer them more calling features and to protect them from competitors.

"WATS is just a long-distance calling plan that offers a few features and is [cheaper] than direct-dial calling," Crooks said. "WATS is clearly a transition to something more dynamic, such as Vnet.

"There will always be users that don't want to migrate," he said. "[But] the future of WATS is very limited."

MCI has a two-pronged strategy in which it sells Vnet to the upper half of its large customers and MCI Vision to customers that spend less than $50,000 per month on outbound calling, Crooks said.

MCI Vision is a new outbound long-distance service that has a flat-rate pricing structure and options including consolidated billing and multilocation volume discounts.

Walton agreed with Crooks' assessment.

"If I move customers from WATS to a virtual network, I'm moving them into a vibrant service that can grow with their company," Walton said. "WATS is just a means to an end."

High volume discounts

Users, such as direct marketing companies that used WATS service for calling noncorporate locations, say virtual networks offer lower rates than WATS for intra-company traffic and almost identical rates for off-net calls. But virtual networks offer bigger volume discounts.

Users that want to replace WATS with a virtual net service can contract for the minimum on-net to on-net call volume allowed by a carrier — typically 5% — and use the service primarily to dial off-net sites.

Even the most ardent WATS supporters, including retailers and hotels, are leaving WATS for virtual networks mainly for the higher volume discounts, said Glenn Starr, Software-Defined Network (SDN) product manager for AT&T.

Corporations with at least five locations that generate two million minutes of long-distance traffic per year, the equivalent of $20,000 to $25,000 a month, should consider moving to SDN, Starr said.

Incentives

To bring major users aboard their flagship virtual network services, carriers are offering long-term, fixed-rate contracts and a variety of optional features, including data-handling capabilities.

They are also offering significant volume discounts and waiving installation charges in special promotions.

For example, AT&T ran a promotion from Aug. 15 to Oct. 15, 1989, in which it waived service establishment charges, access-line installation charges and installation charges for three optional features of SDN.

The promotion helped AT&T almost quadruple its SDN customer base from 119 to 500 last year, according to a recent Federal Communications Commission report.

AT&T's Starr said almost half of these users migrated from AT&T's high-end WATS services.

The new data options include AT&T's Software-Defined Data Network (SDDN), which was announced at the International Communications Association's annual conference last May. SDDN enables users to establish high-speed switched data links on demand and will support 56K, 64K and 384K bit/sec links.

At the Tele-Communications Association, Inc.'s annual conference last month, MCI announced Virtual Private Data Services, switched T-1 and T-3 services that are scheduled for availability in the third quarter of 1991.

Marcus Canipe, a product marketing manager with US Sprint, said about 30% of its current Virtual Private Network (VPN) customer base comprises former WATS users. US Sprint pushes VPN to users that spend more than $25,000 per month on outbound long-distance calling.

US Sprint is currently waiving a long list of charges for all new and current VPN customers, including installation, account code and speed number charges.

One converted user

Sherwin-Williams Co. of Cleveland is among the WATS users that have migrated to SDN.

John LeSueur, an internal consultant with Sherwin-Williams, said the firm is nearing completion of a migration to SDN that began last fall. Many of the paint products company's 2,000 SDN locations used MCI's high-end WATS service.

"SDN offered us the opportunity to cut and control communications costs," LeSueur said. "And we've been able to substantially reduce the number of man-hours needed to manage our telecommunications operations."

LeSueur said each WATS site saved 20% to 25% by moving to SDN.

"We were tired of constantly optimizing our [sites] for cost," LeSueur said. "The carriers were constantly changing their rates, which made it difficult for us to maximize our company's investment [in communications]."

Daniel Briere, president of TeleChoice, Inc., a consultancy in Montclair, N.J., said carriers use feature introduction as a means of attracting WATS users to virtual networks.

"They usually roll out new features and capabilities for their virtual network services first and may not introduce them for other services like WATS until sometime later, if at all," he said.

Walton said virtual network offerings bring in more revenue than WATS. "Virtual networks have loads of optional features, while WATS offers only a handful," he said. "And virtual network features are not cheap." ☒

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Calendar

Oct. 22-26, Nice, France — European Unix systems User Group (EUUG) Technical Conference and Exhibition. Contact: EUUG, Owles Hall, Buntingford, Herts, SG9 9PL; 44-763-73039.

Oct. 24-26, Boston — The Fiber Optic and Computer Networking Exhibition & Conference. Contact: American Electronics Association, 5201 Great America Pkwy., Santa Clara, Calif. 95054; (408) 987-4200.

Oct. 25-26, San Jose, Calif. — Local Area Networks. Contact: Data-Tech Institute, P.O. Box 2429, Lakeview Plaza, Clifton, N.J. 07015; (201) 478-5400.

Oct. 29-31, Washington, D.C. — Government Communications Conference II. Contact: Corporation for Open Systems, 1750 Old Meadow Road, McLean, Va. 22102; (703) 883-2765.

Oct. 29-Nov. 1, Boston — Electronic Imaging East 90. Contact: Registrar, Electronic Imaging East, 1050 Commonwealth Ave., Boston, Mass. 02215; (800) 223-7126.

Oct. 31-Nov. 2, Washington, D.C. — UNICOM '90 Expo & Conference. Contact: UNICOM '90 convention office, Suite 2200, 333 N. Michigan Ave., Chicago, Ill. 60601.

Nov. 4-9, Boston — OPTCON '90. Contact: The International Society for Optical Engineering, P.O. Box 10 Bellingham, Wash. 98227; (206) 676-3290.

Nov. 5-8, New Delhi, India — International Conference on Computer Communication '90. Contact: Conference Secretariat, CMC Ltd., A-5 Ring Road, S. Extension Part 1, New Delhi 110 049; 91-11-626807, 618189.

Nov. 12-14, Atlanta — The 17th Annual Computer Security Conference. Contact: Computer Security Institute, 500 Howard St., San Francisco, Calif. 94105; (415) 267-7651.

Nov. 12-16, Las Vegas — Comdex/Fall '90. Contact: The Interface Group, Inc., 300 First Ave., Needham, Mass. 02194; (617) 449-6600.

NSFNET to employ IBM T-3 routers

continued from page 2

tor of high-performance computing and communications for IBM academic information systems. "We want to build on that and, ultimately, commercialize the technology. But how we might do that is hard to say right now."

IBM has already developed a product from the Simple Network Management Protocol-based management system used on the NSFNET ("Prototype of IBM TCP/IP mgmt. tool trialed at Merit," *NW*, Feb. 26).

NSFNET is operated by Merit, Inc., in conjunction with IBM and MCI Communications Corp., with primary funding from NSF and additional funding from the state of Michigan. More than 2,400 regional, state, local and foreign networks can access the NSFNET backbone.

Hans-Werner Braun, principal investigator for Merit, said T-1 routers used today were developed in 1987 and installed in 1988 to replace routers on what was then a 56K bit/sec backbone.

"In 1987, there were a few vendors that claimed they were doing T-1, but it wasn't that great," he said. "It's not enough to have a T-1 card; you also need to be able to switch a lot of packets."

Each of the 14 NSFNET nodes are 4M bit/sec Token-Rings supporting about nine RT Personal Computers, which perform three distinct functions but collectively act as a single router. The routers support the Internet Protocol and, in a prototype stage, the Open Systems Interconnection Connectionless Network Protocol.

Running software developed by IBM, one RT Personal Computer at each node acts as the routing control processor (RCP). The RCPs maintain routing tables that track the optimal routes along which packets should be sent based on factors such as congestion and circuit cost.

At each node, one RT Personal Computer is dedicated to each incoming T-1 line. Typically, each node has three T-1s, and each T-3 is supported by A Real-Time Interface Coprocessor card from IBM.

Another RT is dedicated to the external Ethernet or FDDI card that links the RT to the regional or supercomputer net.

The RT Personal Computers supporting T-1s or external interfaces are known as packet-switching processors. They are supplied with a limited amount of routing data from the RCP so they can forward packets but aren't required to do routing calculations.

Also on each Token-Ring, one RT Personal Computer collects statistics to help in planning network growth. And that growth has been dramatic. Dave Katz, systems research programmer III at Merit, said NSFNET traffic increased 11.13% during the month of September, when the backbone supported more than 2,400 networks and carried 4.14 billion packets.

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Carriers post mixed 3Q financials

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$62.2 million in the third quarter last year. US Sprint reported a $42 million operating loss for the second quarter.

The carrier's revenue rose to $1.28 billion in the third quarter, up more than 15% from $1.11 billion in the third quarter last year.

US Sprint's parent company, United Telecommunications, Inc., moved to trim costs at its long-distance arm recently by cutting 1,000 jobs and streamlining US Sprint's billing system. But the nation's third-largest long-haul carrier still reported a 17% increase in expenses, to $1.22 billion in the quarter.

William Esrey, United Telecom's chairman, said the long-distance business displayed "marked improvement" in the third quarter compared with the second quarter, but he added, "We're not yet where we'd like to be."

Long-distance market leader AT&T reported increases in both earnings and revenue for the third quarter compared with the previous year — what AT&T Chairman Robert Allen referred to as "solid results in the face of a softening economy."

Earnings grew by almost 1.9% to $712 million for the quarter compared with $699 million in the third quarter last year. Revenue rose to $9.4 billion, up 5.2% from $8.9 billion in the third quarter of 1989.

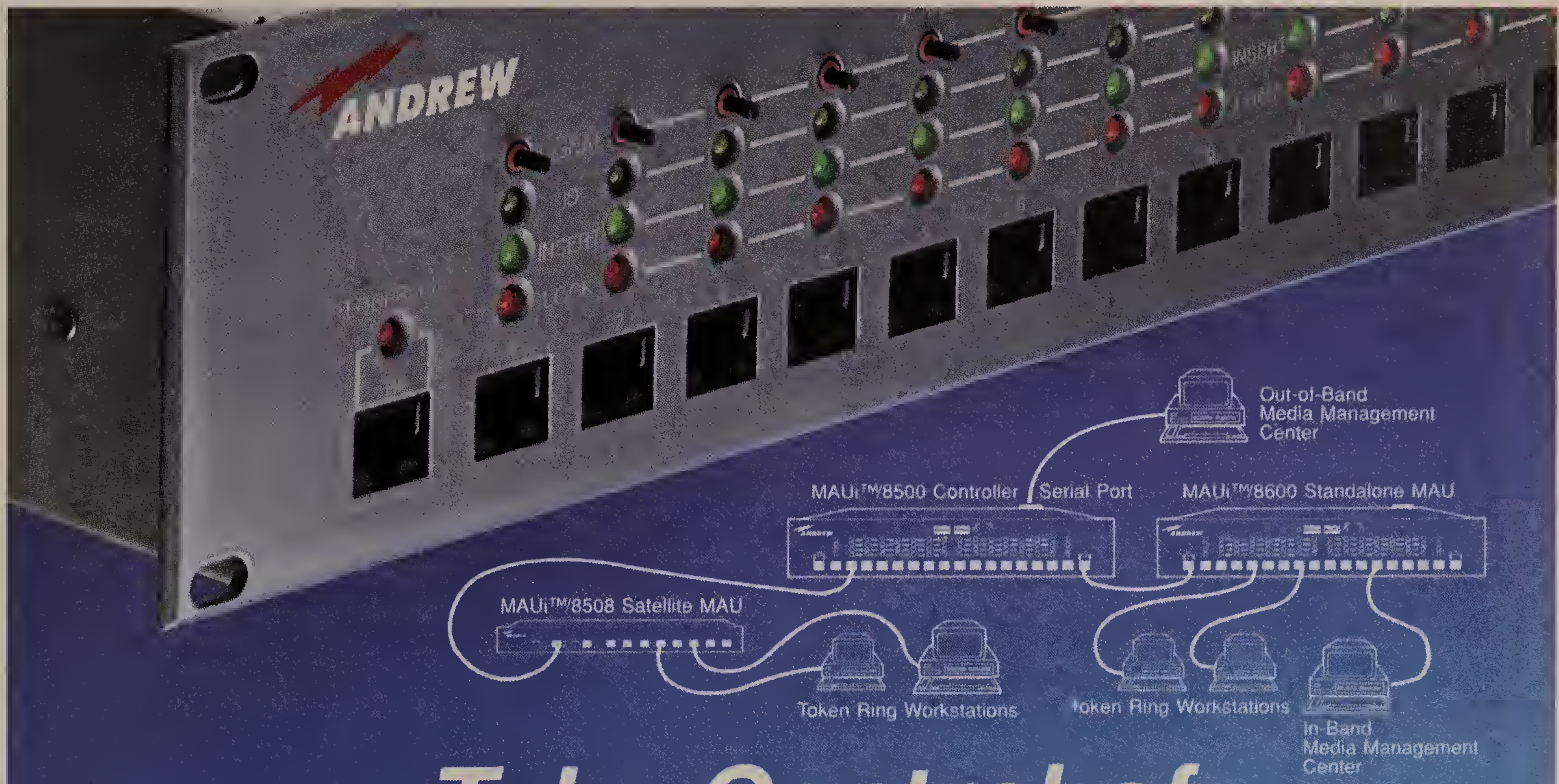
Long-distance revenue grew 1.5% to almost $5 billion on calling volume growth of 7% for the quarter. Network equipment sales grew 12.7% over last year's third quarter in what analysts described as something of a surprise given the market slowdown in recent years.

AT&T's earnings would have been stronger were it not for steep start-up costs related to the AT&T Universal Card, the company's new combination calling/credit card, according to AT&T officials. Analysts concurred.

In general, the Big Three carriers' third-quarter results provide evidence that the long-distance industry's runaway growth is a thing of the past, said John Bain, an analyst at Raymond James & Associates, Inc., a St. Petersburg, Fla., brokerage firm.

Growth and usage increases were largely the result of annual price cuts of about 7% from 1984 to 1989, but the carriers have also become more conservative about discounting prices, he said.

Bain said the carriers still have strong cash flows that they can employ to bring new services to market, which is good news for users. ◘



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NSFNET to employ IBM T-3 routers

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In September 1989, when about 800 networks were connected to the NSFNET, it handled roughly 1.6 billion packets.

The T-3 backbone to be installed by year end is expected to support that growth along with new bandwidth-intensive applications, Katz said.

Facing the need for T-3, the NSFNET found itself in much the same predicament as in 1987. While off-the-shelf T-1 routers may be purchased that can outperform the RT Personal Computers, T-3 routers are generally still on the drawing board.

Essentially the same routing software that now runs on multiple RT Personal Computers will run on a single RISC System/6000. And its Micro Channel Architecture bus will replace the Token-Ring by connecting T-1, T-3, Ethernet and FDDI adapter cards.

The RISC System/6000 routers will be collocated at MCI junction points, where major portions of the carrier's network cross, Braun said. They will be linked via individual T-3 lines or multiple T-1s to another RISC System/6000 router at one of eight regional network or supercomputing sites. FDDI or Ethernet links will connect computers at those sites to the T-3 router.

Braun said there are tentative plans to interconnect the T-3 and T-1 backbones at three NSFNET backbone locations. If the T-3 net proves reliable, more sites could be tied to it, he said.

Ingres extends capabilities of DBMS

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work with the company's existing Ingres/Net, which runs on an Ingres/Star server and a remote data base host, and establishes a connection between the machines. The new gateways work in tandem with Ingres/Net and convert Ingres SQL requests into formats recognized by IBM or DEC DBMSs.

The gateways enable users to access data from IBM or DEC data bases via "join" routines. Joins are data base tasks initiated when a user requests data residing on separate DBMSs; the request retrieves data from the different sites and joins it for presentation to the user. Users can also update data on IBM or DEC data bases through the gateways.

The DEC gateways were upgraded to support the Remote Database Access (RDA) protocol built into Ingres/Star, according to Kathy Hession, Ingres' gateway product manager.

RDA is a standard Open Systems Interconnection protocol used to facilitate client/server data base connections, said Eric Wasiolek, product manager of Ingres/Net and Ingres/Star.

All of the gateways are shipping now, with the exception of Ingres/Gateway to IMS, which is scheduled to ship by year end. Pricing for the gateways ranges from $2,500 to $150,000 for Rdb or RMS, and $50,000 to $400,000 for DB2, IMS or SQL/DS versions.

Two-phase commit protocol

Perhaps the most significant enhancement to Ingres/Star is the addition of an automatic two-phase commit protocol. The capability enables users to automatically update all Ingres/Star data bases across a network.

Using the two-phase commit protocol, Wasiolek said, Ingres/Star checks to make sure all data bases are available for updates. If certain data bases are unavailable, Ingres/Star aborts the update procedure.

One limitation is that Ingres/Star supports two-phase commit operations only on Ingres data bases.

"We're waiting for the industry to standardize on a single two-phase commit standard," Wasiolek said. "When that happens and when IBM and DEC make their intentions clear, we'll extend two-phase commit support beyond our boundaries."

The company also added an autorecovery management feature to Ingres/Star that kicks in when the distributed data base manager fails during a join procedure. If an Ingres/Star server fails, the feature instructs another server on the network to complete the join task.

The autorecovery feature can also update any Ingres/Star server that is temporarily disabled at the time of an update, Wasiolek said.

For instance, if a local or remote DBMS is down during a data base update, the autorecovery feature keeps track of the current data versions on other servers and updates the idle data base when it returns to service.

Ingres also announced StarView, an Ingres/Star feature that enables systems managers to create, monitor and alter distributed data bases from a central location. Managers can also monitor LAN connections.

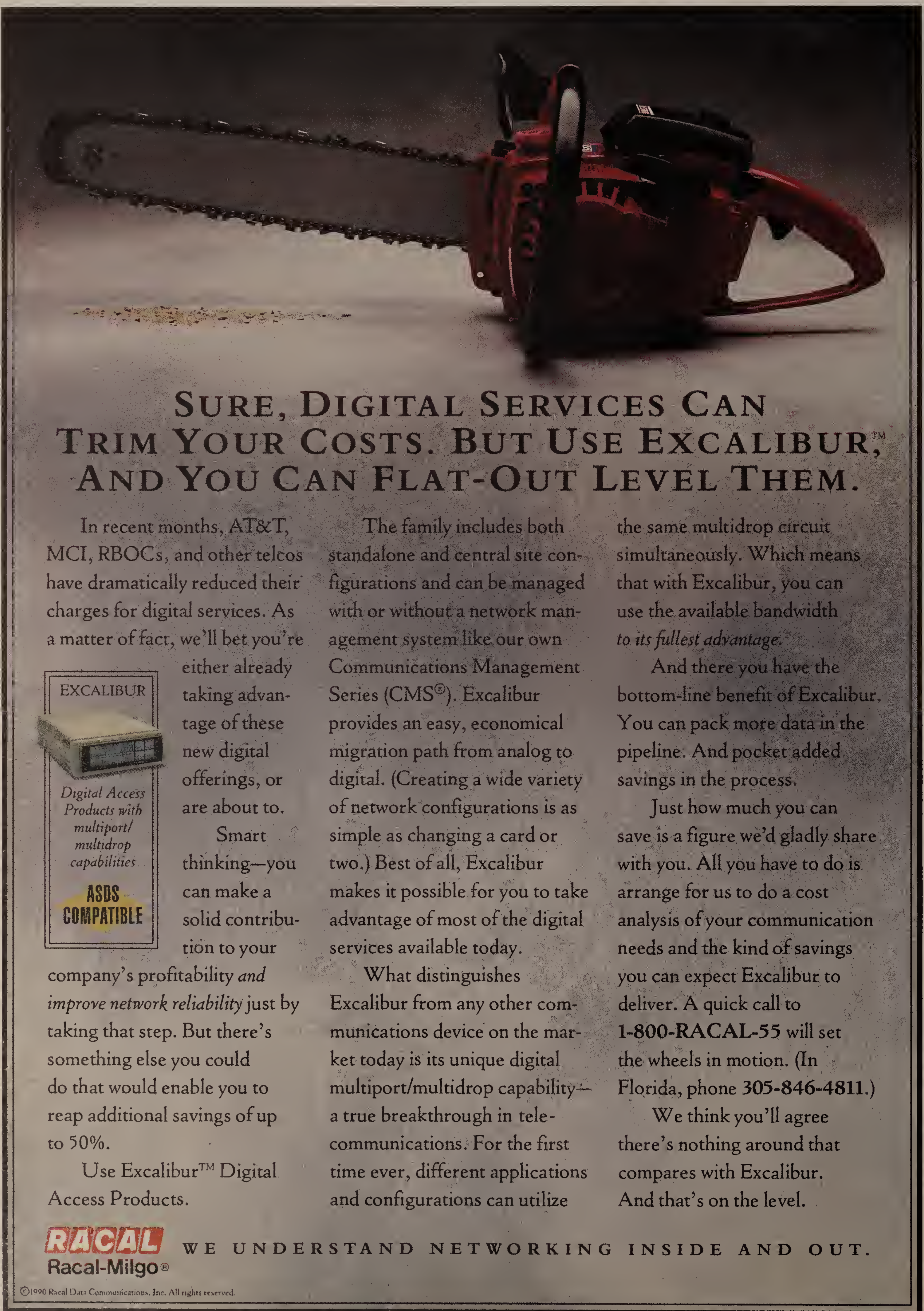
The feature enables managers to view local data base activity, examine data base types and display local data tables.

Ingres is working to provide hooks from StarView to integrated network management systems so net administrators can open an IBM NetView window, for instance, from within StarView, Wasiolek said.

Currently, StarView is accessed via a pull-down window within Ingres/Star that provides users with a command-line interface.

Eventually, the company said it hopes to offer a graphical interface, complete with a network map displaying the status of data bases and network links.

The enhancements to Ingres/Star are offered as a free upgrade to current customers. The software price, which remains unchanged, ranges from $2,100 to $130,000.



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AT&T, KDD to use optical technology

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can handle any transmission rate supported by the end nodes.

They avoid the photon-to-electron conversion bottleneck inherent in regeneration repeaters by routing photons through optical amplifiers located along fiber cables that consist of lasers and spools of fiber-optic cable laced with the rare-earth element erbium.

Erbium has the ability, when struck with a laser, to amplify any photonic signal flowing through the encased fiber.

"There's no reason why you couldn't eventually transmit at a terabit [per second using optical amplifiers]," said John Kreidl, president of Waveguide Associates, a Cambridge, Mass., consultancy specializing in fiber optics. By contrast, Haw-4/TPC-3 will run at 280M bit/sec for its entire 25-year life span.

The ability to support ever-increasing speeds could have a dramatic affect on the cost of international communications.

Increasing transmission rates lower the cost of carrying network traffic between continents. Since TPC-5 will support eight times more capacity than Haw-4/TPC-3 yet cost approximately as much as that system to install, it will reduce communications costs by nearly seven-eighths.

Subsequent increases in capacity would further reduce transmission costs. Eventually, the concept of capacity constraints on international traffic could be called into question. Some experts have already speculated that the 2.4G bit/sec capacity of TPC-5 would be able to handle all telephone calls between the U.S. and Japan with room to spare.

"It heralds a real sea of change, because if capacity is no longer a restriction, then the whole reason to have prices ration demand goes out the window," said Gregory Staple, an independent lawyer in Washington, D.C. specializing in international communications.

Staple predicted that carriers eventually may be forced to roll out flat-rate international pricing plans that mirror existing local calling plans. This would let consumers place as many international calls as they choose for a single monthly fee.

Other observers cautioned, however, that the savings carriers experience may not be fully passed on to consumers, since carriers will focus on using their cost savings to increase profits.

Although there is no dire need to implement optical amplification technology on land-based networks because the mid-cable repeaters are accessible, carriers around the world are moving ahead with plans to adopt the technology. An AT&T spokesman said the carrier expects to start using optical amplifiers on its terrestrial network by 1992.

The biggest benefit, however, will be on submarine cables. Officials with British Telecommunications PLC and Cable & Wireless PLC said it could become the dominant technology for underwater cables installed after the mid-1990s.

Charlie Hogan, head of facilities planning in the Pacific for AT&T, said the carrier is also planning to use optical amplification on TPC-5's successor, TPC-6. ☐

Retailer paints rosy picture of migration

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Communications, Inc. to avoid having to bring its communications staff up to speed on a foreign technology.

Target decided to scrap its terrestrial data network in favor of a VSAT net for several reasons, Machones said. Among them was that the VSAT network came at a fixed cost, whereas terrestrial line rates increased without warning.

The network is also extremely flexible. Target expects to add 300 new stores over the next five years and will only need to install a VSAT on the roof of each new store instead of waiting weeks or months for carriers to cut over the necessary lines.

Going with the VSAT net "was a matter of control," Machones said.

Target also chose a VSAT network to improve the reliability of its communications infrastructure. Response time has become more consistent — close to five seconds for most data applications. The terrestrial net supported unpredictable response times of between four and 30 seconds, Machones said.

The VSAT network has also proven its ability to withstand natural disasters.

When Hurricane Hugo hit the southeastern U.S. last year, Target lost communications with all of its stores in the area except the two that had recently installed VSATs. In addition, when an earthquake rocked the San Francisco Bay area last year, Target's San Jose, Calif., store was damaged but communications survived.

A bonus benefit of switching to the VSAT net has been Target's transition of voice traffic onto the net. Previously, Target ran both voice and data traffic over a private net from AT&T and terrestrial lines from numerous local phone companies.

Using a VSAT network for voice traffic is somewhat out of the ordinary, Machones admitted. But he said the quality of the voice traffic is fine and the half-second propagation delay is something that store managers "learned to live with fast" when they found out their intracompany phone calls on the VSAT net were free.

Among Target's future plans is to grow its data applications over the net to include local-area network-to-wide-area net communications, as many of Target's computer systems are based on LANs, Machones said. Target is working with Hughes Network Systems and IBM to develop LAN interconnection applications. ☐

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NCR serves up OSI, SNA wares for System 3000

BOSTON — NCR Corp. last week announced a set of network software tools, including Open Systems Interconnection products, for the System 3000 line of Unix-based processors it introduced last month.

NCR said it will provide a seven-layer OSI protocol stack free of charge on the initial offerings in the System 3000 line — the System 3300, 3400 and 3500 workstations. Called OSIready, the software complies with the U.S. Government OSI Profile (GOSIP) as well as the U.K. GOSIP and will enable System 3000s to run OSI-based applications developed by NCR, other vendors and end users.

Scheduled for delivery in the first quarter of next year, OSIready includes driver software that enables the System 3000s to use OSI's Transport Classes 0, 2 and 4 as well as OSI's Connectionless protocols. The software also includes upper-layer OSI services needed for such functions as establishing sessions between OSI applications on different computers and presenting information to the end user.

NCR also released File Transfer, Access and Management (FTAM), X.500 directory and X.400-based electronic mail applications that build on OSIready. Those applications range in price from $800 to $44,700.

OSIready was developed with OSI software licensed from Retix and is an enhanced version of OSI software NCR released last January for its line of Unix-based Tower processors.

NCR also announced versions of its IBM Systems Network Architecture software for the System 3000. The firm announced packages supporting 3270 terminal emulation, Remote Job Entry, Systems Network Architecture Distribution Services and Advanced Program-to-Program Communications. The packages are priced from $650 to $39,200 and will be available in the first quarter of 1991. Similar packages are available for the Tower line.

NCR also released a new version of the Unix workstation-based NCRNet Manager, its integrated network management system designed to manage Ethernet and token-ring networks running OSI or Transmission Control Protocol/Internet Protocol, as well as X.25 wide-area networks.

Version 3.0 of the package enables users to monitor and configure NCR's Open Network System router, also announced last week (see "NCR rolls out router for OSI backbones," page 1). It can also pass alerts to IBM's NetView or Systems Center, Inc.'s Netmaster network management packages on IBM mainframes.

NCR said it will bundle Endnode Manager software free on the System 3000, enabling NCRNet Manager to control those new processors, and said NCRNet Manager can now manage DOS- and OS/2-based servers or workstations as well as AT&T Unix System V.4-based servers.

Version 3.0 will be available in the first quarter of 1991 and ranges in price from $5,000 to $10,000.

— Jim Brown

AT&T upgrade gives users PRI

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serving offices have analog 1AESS AT&T switches or Northern Telecom, Inc. DMS-100 switches, which will not support PRINCE.

"Certainly the features proposed are exciting, but PRINCE fails to address other AT&T switches and switches made by Northern Telecom and Siemens [AG]," said Daniel Gonos, store systems program manager for Domino's Pizza, Inc. in Ann Arbor, Mich. Domino's stores use 500 Centrex lines distributed among the seven RBHC regions.

"We would love to have INFO-2 for calls to our customer service group," Gonos said. "That would help us identify customers and process their calls quicker. And call-by-call [service selection] would definitely have value for future data communications applications."

INFO-2 is AT&T's automatic number identification service used to deliver the main billing telephone number of the calling party. Call-by-call service selection enables users to utilize any PRI B channel for any inbound or outbound switched service.

Companies will also be able to use PRINCE to access PRI ADCR, a feature targeted at customers with two or more 800 call centers. With ADCR, 4ESS switches can direct calls to other prespecified sites if the first site is inoperative or busy.

In addition, AT&T customers can access SDN, Megacom, Megacom 800 and MultiQuest.

Users can also use the PRI links to access the carrier's Accunet Switched Digital Services which operate at speeds of 56K, 64K restricted and 64K bit/sec clear channel. ☐

NCR rolls out router for OSI

continued from page 1

wards data to the target device.

The product will let users consolidate IBM Systems Network Architecture traffic on the same backbone used to route Transmission Control Protocol/Internet Protocol, Digital Equipment Corp.'s DECnet, Novell, Inc.'s Integrated Packet Exchange (IPX), Xerox Corp.'s Xerox Network System and OSI traffic.

Analysts praised ONS' ability to merge IBM's Systems Network Architecture traffic on the same backbone as local-area network interconnect traffic. Currently, IBM cluster controllers and front-end processors cannot route traffic between LANs that use non-IBM protocols, and existing LAN routers from companies such as cisco Systems, Inc. and Wellfleet Communications, Inc. do not support SNA traffic, analysts said.

"This is a capability that hasn't really existed before," said David Passmore, a partner with Network Strategies, a network consulting practice of Ernst & Young in Fairfax, Va. "ONS eliminates the need for customers to have a separate network for SNA and another network for LAN interconnection traffic."

NCR also announced a sweeping set of networking tools for its recently announced System 3000 computers. NCR will include at no cost a full suite of OSI software with each System 3000 and will market SNA and TCP/IP software for the machines. NCR also introduced an enhanced version of its NCRNet Manager network management software that features the ability to configure and manage ONS routers (see "NCR serves up OSI, SNA wares for System 3000," this page).

ONS is based on the System 3000 and comes in two models, each of which includes a Network Processor board that performs routing and bridging functions. The 3320 adds support for as many as four Micro Channel Architecture-based LAN or wide-area network interface boards while the 3445 supports as many as seven LAN or WAN boards. An expansion cabinet can be attached to the 3445 to add 16 more boards.

Interface boards link the ONS to Ethernets, 4M or 16M bit/sec token-ring networks and Fiber Distributed Data Interface LANs. NCR also provides RS-232, RS-422 and V.35 boards that attach the ONS to wide-area circuits operating at up to T-1 speed. NCR is developing boards to support Integrated Services Digital Network Basic Rate Interface and Primary Rate Interface circuits, as well as Switched Multimegabit Data Service circuits.

> "ONS eliminates the need for customers to have a separate network for SNA."

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ONS can assist users in building an OSI backbone since it supports OSI's End System-to-Intermediate System and Intermediate System-to-Intermediate System protocols. The End System-to-Intermediate System protocol enables end-user systems such as microcomputers to communicate with a router. The Intermediate System-to-Intermediate System protocol enables routers to communicate with each other.

When an ONS receives non-OSI traffic from a local device, it wraps it into a packet that support's OSI's Connectionless Network Protocol. A remote ONS unwraps the packet and passes it to the target local device.

In addition to routing other vendors' network protocols in OSI packets, ONS can be configured as a multiprotocol router to pass traffic between devices running the same network software, such as two TCP/IP devices. ONS can also run optional software that enables it to emulate an IBM cluster controller in order to pass traffic over an SNA network.

The ONS can act as a bridge to pass traffic wrapped in protocols that it cannot route between remote LANs. As a bridge, the ONS supports both the Spanning Tree Algorithm and source routing. Optional software also enables ONS to provide OSI services to clients on LANs.

"NCR has bent over backward to provide what users actually need in the networking area," said Mary Modahl, an analyst with Forrester Research, Inc., a consulting firm in Cambridge, Mass.

Modahl said NCR will likely be successful selling ONS to users of front-end processors made by NCR Comten. However, it may have trouble selling ONS to others since many users don't see the firm as a network vendor.

"NCR needs to reposition its image as much as it has repositioned its product line," Modahl said. Others said an ONS could even replace a low-end NCR Comten front-end processor if NCR adds a mainframe channel interface to the product. NCR last week said it has not yet decided if it would do that.

NCR Comten actually introduced the concept of building a common backbone capable of routing OSI, TCP/IP and SNA traffic when it announced OSI/Communications Processor software for its 56X5 front ends last March. ONS nodes, which cost between $16,000 and $100,000, provide a low-cost alternative to building a common backbone using NCR Comten front-end processors, which cost from $60,000 to more than $100,000. ☐

NCR makes good on blueprint promises

Announcements supporting NCR's Open Cooperative Computing Architecture

February	Announced Cooperation software tools that help developers build client/server office automation applications.
September	Unveiled System 3000 line of AT&T Unix System V.4-based laptops, workstations, servers and superservers.
October	Rolled out Open Network System router that transports various data types across OSI backbone.

SOURCE: NCR CORP, DAYTON, OHIO

NETWORK WORLD

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DEC unveils a 486-based superserver

continued from page 1

there, I consider it a superserver," said Bob Burley, manager of product marketing for GSB's SCO Intel products. "If Compaq's SystemPro is a superserver, then this is definitely a superserver."

Burley said the server, whose price starts at about $18,000, offers computing power previously available only on minicomputers and mainframes at a price affordable to smaller users.

GSB, which will sell the server through value-added resellers, serves small to mid-size businesses.

The ApplicationDEC 433MP has an eight-slot Corollary, Inc. system bus and a six-slot Industry Standard Architecture (ISA) bus. The Corollary bus supports 80486-based CPUs, memory boards and Small Computer System Interface disk controllers. The system comes with 8M bytes of system memory, expandable to 64M bytes. It supports from 200M to 6G bytes of disk storage. The ISA bus can be outfitted with any ISA cards.

When configured with six CPUs, ApplicationDEC 433MP can support as many as 128 users on terminals, DOS, OS/2 or Unix workstations, as well as X Window System terminals.

In its initial release, the server can run SCO's LAN Manager/X for Unix. In the spring of 1991, the software will be upgraded to support DECnet, Burley said.

Users can configure the server with third-party software to support Transmission Control Protocol/Internet Protocol and Sun Microsystems, Inc.'s Network File System. In a base configuration, the server will cost $18,395. Fully configured with four 80486s, 64M bytes of memory and 6G bytes of storage, it will cost $110,570. The server is expected to be available in the first quarter of 1991.

This is a serious entry into the server market that directly challenges Compaq's SystemPro, said Howard Niden, senior manager and director of the VAX specialty consulting practice at Price Waterhouse in Chicago.

But John McCarthy, director of professional systems research at Forrester Research, Inc. in Cambridge, Mass., said the machine's performance will suffer running LAN Manager/X.

A 20% hit

"You're doing file translation from the DOS and OS/2 file structure to Unix" under LAN Manager/X, McCarthy said. "This causes about a 20% hit in response time" when compared with OS/2 LAN Manager.

Introduction of the product pushes a confrontation that is bound to result as minicomputer vendors extend their reach into the LAN server market, according to Steve Wendler, vice-president at Gartner Group, Inc. in Stamford, Conn. "Compaq is moving uptown with bigger servers, while DEC is moving downtown into the PC LAN server market," he said.

Price Waterhouse's Niden agreed, saying he is mystified about DEC's strategy in offering a server that could prove more attractive than the VAX. "They may have a short-term hit, but their premier line still is the VAX," Niden said. "I've heard people refer to eating one's children here."

But DEC asserted that the VAX and the ApplicationDEC 433MP are targeted at different markets, and that customers will make application-driven hardware selections. "There's a huge application portfolio that runs under SCO Unix," said Gary Eichhorn, vice-president of GSB at DEC. "When you map those out compared to the applications that run on the VAX, they are highly complementary."

Wang takes steps to pump VS as server

continued from page 6

tions. For instance, Wang's Windows InfoSharer running on a personal computer under Microsoft Corp.'s Microsoft Windows enables users to cut data from VS applications and paste it directly into personal computer applications. The software costs $295. Wang also released software enabling LAN-attached microcomputers to extract, display and print images stored under the VS-based Wang Integrated Image Systems (WIIS). VS WIIS Image Workstation 3.0 costs $500.

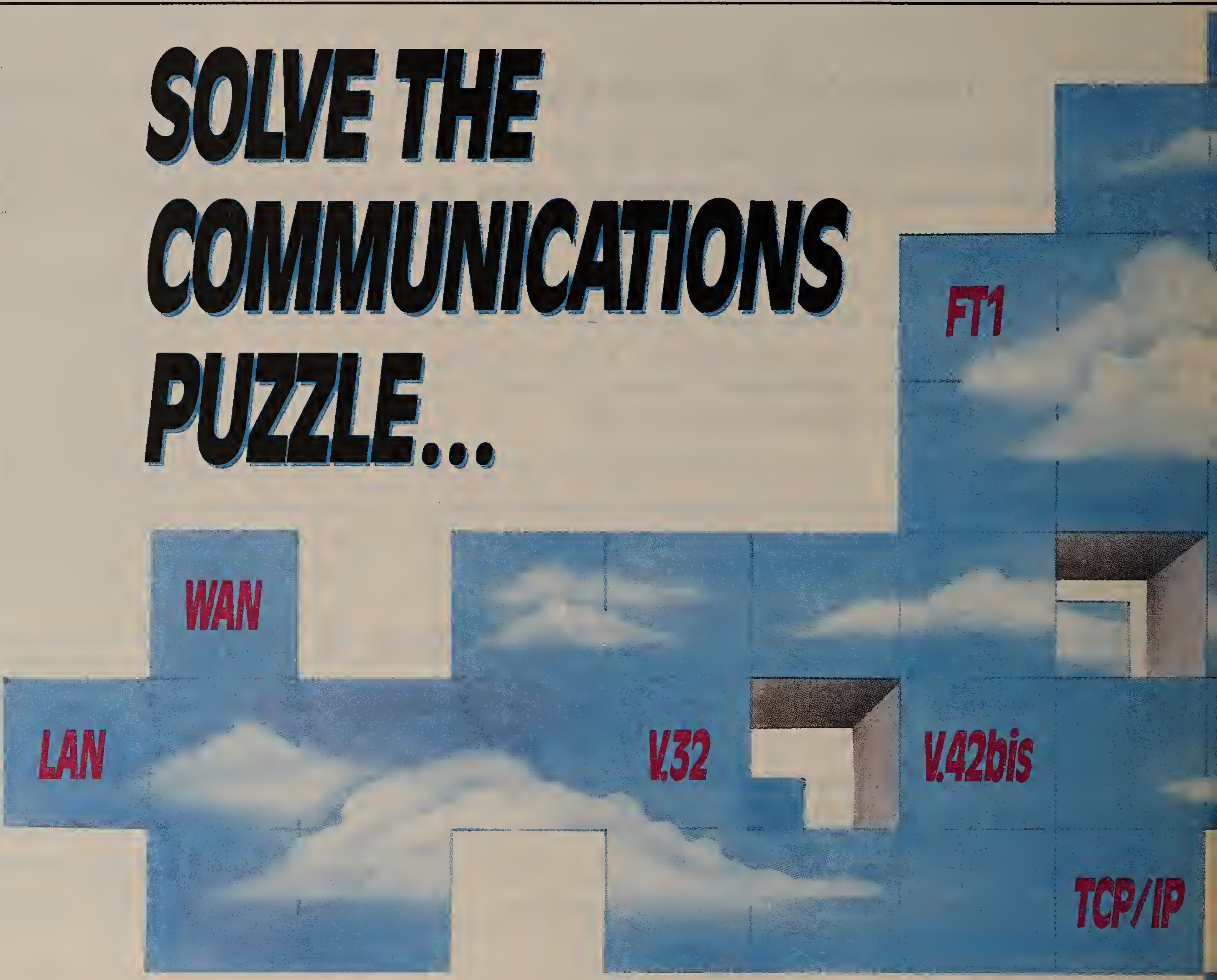
In addition, Wang is making available its OPEN/client 3270-Windows, which works with its VS/PC SNA Services 3270, a terminal-emulation program that links Wang VS minicomputers to IBM mainframes. OPEN/client 3270-Windows costs between $1,480 and $7,680.

Users can purchase development software from Graphic Software Systems, M/H Group, Easel Corp. or NetWise, Inc. that will help them build client/server applications that work with OPEN/server — VS.

Wang also released two software products that enable personal computers on LANs running VINES, NetWare, 3Com's 3+Share, IBM's PC LAN Program or IBM's OS/2 LAN Server to emulate Wang VS terminals and use VS-based applications. PC LAN/VS Access and PC LAN/VS Windows, which comprise software running on both the VS and personal computers, are available now.

In addition to terminal emulation, PC LAN/VS Access works with Windows InfoSharer software to transfer data between VS applications and personal computer applications. PC LAN/VS Access costs between $1,250 and $10,250.

PC LAN/VS Windows enables personal computers running Microsoft Windows to emulate VS terminals. It also enables microcomputers to display images stored under Wang's WIIS. The software costs $7,500.



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Users take wary view of frame relay

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technology is unproven and add that frame relay standards are not yet complete.

The common fear of both camps is that early frame relay offerings will not interoperate because they will be based on incomplete standards.

"We'd like to implement frame relay in our network in a matter of months," said John Boyd, senior engineer for Northeast Utilities, a power firm in Hartford, Conn. "But we aren't interested in products that are bastardizations of frame relay."

Frame relay is a streamlined version of packet switching that is more efficient and supports higher speeds, making it an attractive alternative to circuit switching. In addition, frame relay enables users to allocate a backbone circuit's bandwith to applications as needed, rather than assigning fixed channels to specific applications.

Countless companies, ranging from T-1 multiplexer vendors to value-added network carriers, have announced plans to introduce frame relay products or services within the next 18 months ("Frame relay: Vendors take fast track," *NW*, Oct. 15).

But that may not be quick enough for companies such as Northeast Utilities. "We can't wait years for mature products," Boyd said. "If vendors are too late to market with robust features, they will lose because we'll use [other] technologies."

Northeast Utilities operates a T-1 backbone network, based on StrataCom, Inc.'s IPX FastPacket multiplexers, that serves 1,500 end users at 46 sites in Connecticut and Western Massachusetts. The network links geographically dispersed token-ring and Ethernet local-area networks, supports mainframe channel extension and carries asynchronous and synchronous data, Boyd said.

"We believe frame relay will be cheaper and give us greater flexibility for peer-to-peer communications," he said. It is hard to quantify projected savings because pricing for most frame relay offerings is not yet available, he added.

The company is particularly interested in using frame relay to make one application available to remote locations that today can only be provided to locally attached minicomputer users. A second application is already available to remote sites but could be more efficiently offered using frame relay.

The two applications, already in use, involve documents and images that are typically viewed quickly and stored, Boyd said. Bandwidth on demand would be cheaper than dedicated links, he added.

The first application enables engineers to scan pictures, diagrams and graphics into Digital Equipment Corp. VAXes as part of compound documents. The documents, which include text and are typically 60M bytes in size, help the company's engineers maintain and repair the firm's power generation facilities.

The documents could be transmitted to remote sites with frame relay and would help work crews to more easily maintain and repair its power generation facilities, Boyd said.

The second application enables Northeast Utilities technicians and engineers at remote sites to verify desired items by viewing 8M byte images of equipment and materials before ordering them. Frame relay would enable the firm to more efficiently support this application, Boyd said.

"We don't want nailed-up bandwidth for these bursty, sporadic applications," Boyd said. "We want to provide bandwidth on demand, and frame relay will help us do that."

Warming to the idea

While Northeast Utilities has spent more than a year tracking frame relay developments, others are just starting to take a look at the technology.

"We're trying to determine whether or not we want to evaluate frame relay for use in our network," said Hal Smith, a network specialist with First Interstate Bank of Oregon, N.A. "The concerns I have are that frame relay isn't a proven technology and standards are not yet set."

First Interstate is midway through a conversion from its current multidrop analog private-line network to an X.25 network based on digital links. The current network spans 16 states west of the Mississippi River, serving over 200 branch offices in the state of Oregon alone.

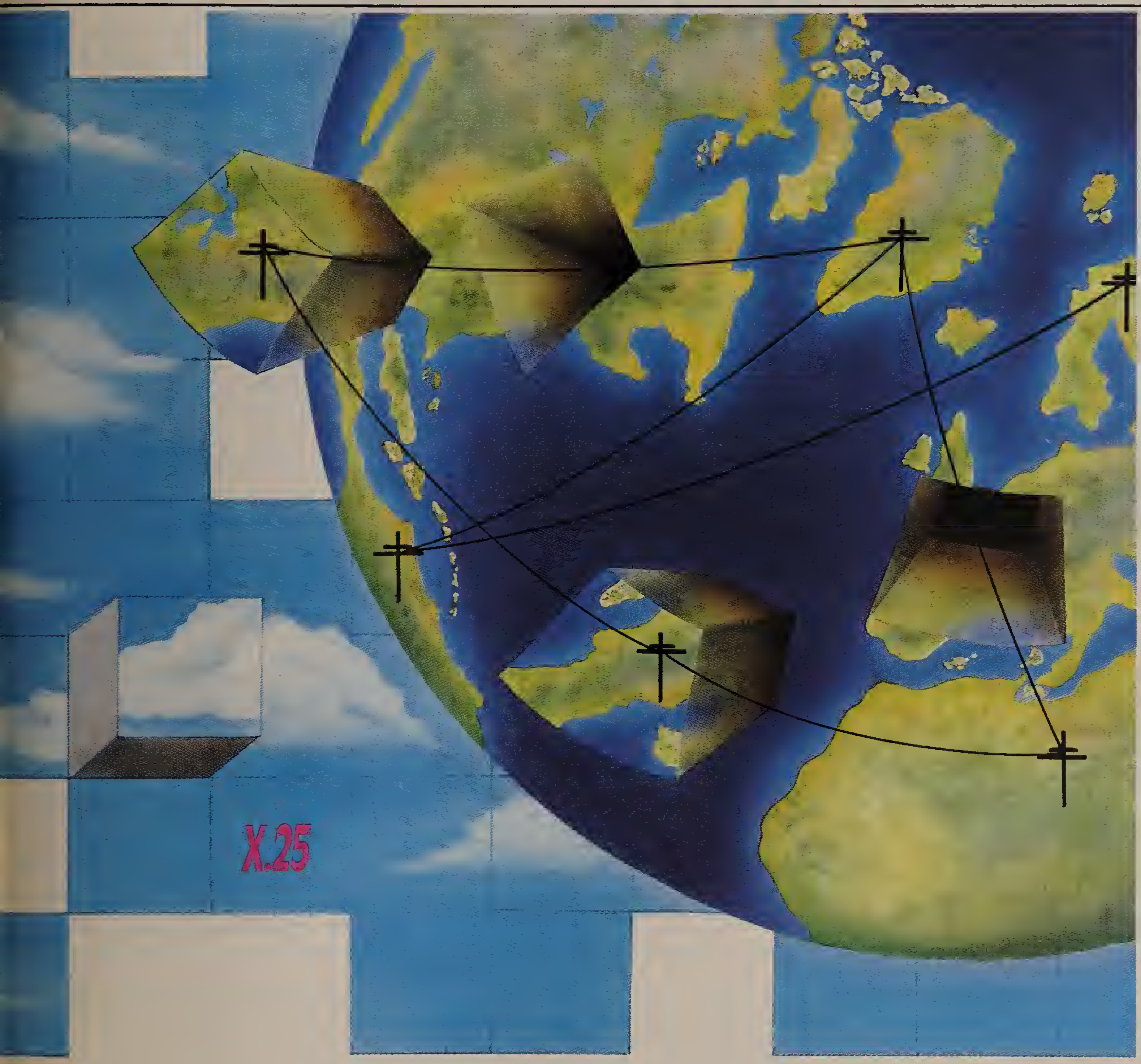
"The difference between X.25 and frame relay is that X.25 is a proven technology and is used everywhere," Smith said. "Frame relay is unproven and has a lot of maturing to do."

Nonetheless, Smith said he is warming up to the technology. "Frame relay has come a long way in the last six months," Smith said. "Six months ago, I would've said I wasn't interested at all in frame relay, but I have to admit my thinking is changing quickly. There's a good chance we'll be using frame relay two years from now."

First Interstate would potentially use frame relay to interconnect IBM Token-Ring Networks at its main Seattle, Portland, Ore. and Omaha, Neb., locations and support wider use of videoconferencing, Smith said.

A few companies outside the U.S. are taking a more proactive approach.

Societe Internationale des Telecommunications Aeronautiques (SITA), a consortium that runs a network used by 400 member airlines, last week said it will begin testing frame relay technology in mid-1991 in order to provide for faster packet switching. The group recently announced that it will replace its existing network with a backbone packet net based on Northern Telecom, Inc.'s X.25 DPN-100 packet switches.



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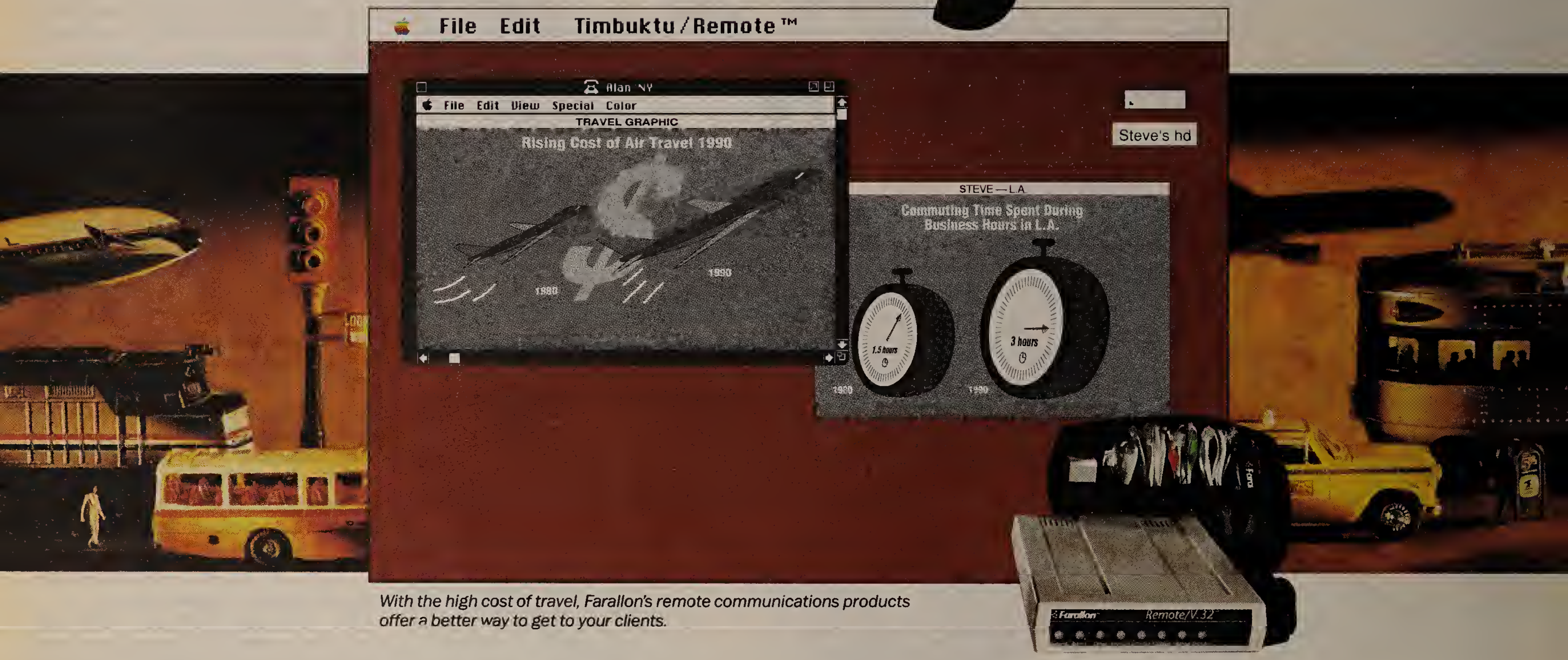
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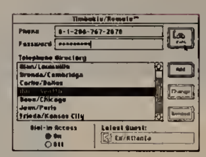

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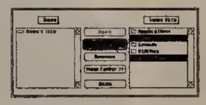

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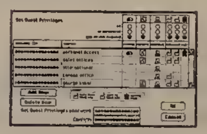

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